X

REVIEW

OF THE

FOREST ADMINISTRATION

IN THE

SEVERAL PROVINCES UNDER THE GOVERNMENT OF INDIA,

FOR THE YEAR

1879-80:

BY

D. BRANDIS,

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Dated the 25th July 1881.

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A

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INTRODUCTION.

Mixed Forests.

AN important and distinguishing feature of the forests in most districts of India is that the more valuable kinds of trees are mixed with other kinds which are not generally used, and for the produce of which there is no demand at the present time. Thus Teak does not form pure forests, but is always mixed with a large number of other trees, which are either valueless or of little value. The Deodar of the North-West Himalaya is, in the majority of cases, associated with other trees, of which two species of Oak (*Quercus incana* and *Quercus dilatata*), the blue Pine, and the Himalayan Spruce (*Pinus excelsa* and *Abies Smithiana*) are the most important. While deodar commands a ready sale, the demand for the wood of the other kinds is exceedingly limited. The same may be said of most other valuable trees; and the forests of Sâl (*Shorea robusta*), in which this tree preponderates over all the other species, form the only noteworthy exception to this rule. But even in the sâl forests there is frequently a much larger admixture of trees of other kinds than is desirable.

The growth of all trees, valuable and without value, stimulated by protection.

2. The efficient protection of our forests against cutting, and against fire also, which has now been maintained during a series of years over large areas, has had the effect of stimulating the growth of all kinds of trees, and of increasing the production not only of the valuable forest produce, but equally so of that which is without value. The difficulty is not only that there is no market for the less valuable kinds of timber, but chiefly that when teak, deodar, and the other more valuable trees are cut, the ground is taken up by trees, bamboos, and shrubs of no value, and that it is difficult to work a mixed forest so as to promote the production of the more valuable kinds. This difficulty is most serious, for a forest is certain to deteriorate if only the more valuable kinds of trees are removed, those of less value being left on the ground.

Remedies attempted.

3. Obviously, the most effective remedy is to increase the proportion of the more valuable kinds by sowing and planting. But the cost of these operations prohibits their extension over more than limited areas. Hence a variety of other measures have been attempted in the mixed forests of different districts, in order to secure preponderance to the more valuable kinds. In some cases the trees of the less valuable kinds are cut out or killed by barking or girdling, and in this way much has already been done to promote the growth of teak in Burma, of sâl in Kumaun, and of deodar in the North-West Himalaya. But even these operations can only be undertaken on a limited scale, partly on account of the expense, but chiefly because they fill the forests with dry wood, which increases the risk of fire and augments its violence.

Attempts made to utilize the inferior kinds

4. The only effectual remedy is to devise a plan by which the inferior woods may be utilized simultaneously with the more valuable kinds. There are some forest districts where the demand bears uniformly upon all kinds of woods, and where the difficulty of managing mixed forests is not felt. In such a position are most tracts of forest and brushwood in the plains of the Punjab, where wood of any kind is scarce, as well as the forests in the vicinity of large stations, such as Chakráta, Ránikhet, and Darjeeling, where there is a large and steady demand for fuel. In such forests every stick is valuable, and they therefore adapt themselves readily to a rational system of management. In other cases there seems a prospect of the railways requiring wood fuel for their locomotives. Thus it is not impossible that the whole of the wood yielded by the Punassa reserve, on the Nerbudda river, in Nimár, and of some adjoining forests, will be required for the working of the Holkar-Neemuch line. Again, as already mentioned, in most of the sál forests of Northern and Central India the greater part of the wood produced can be utilized. Making allowance for those cases in which circumstances are favourable, large areas of mixed forest remain where only one or two of the more valuable species can at present be utilized, and where the great mass of the wood remains unused on the ground. In these cases efforts must steadily be made to utilize the produce which is not used at present, and two measures have been proposed to aid in this direction.

By iron-making.

5. The one is to stimulate, or in some cases to revive or to establish afresh, the industry of iron-making with charcoal, and thus to utilize the inferior kinds of woods. The following extract from a memorandum which was submitted to Government in July 1879 by the writer of the present review bears upon this subject:—

My late inspection of the reserved forests in the Central Provinces (in 1876 and 1877) has convinced me that in the forests which have now during a series of years been protected from fire, in addition to teak, bija-sál, and the other more valuable timbers, large quantities of wood of the less valuable kinds are growing up, which it will be very difficult to utilize. And yet, unless we can cut and utilize these less valuable kinds, the rational working of these forests will become exceedingly difficult, if not impossible. There are, it is true, a few forest tracts where teak, bamboos, and other valuable kinds have the upper hand, and where the difficulties here adverted to do not exist; but these favoured tracts occupy a small proportion only of the total area under protection from fire.

In a few cases charcoal-making may enable the Forest Administration of the Central Provinces to utilize the wood of the less valuable kinds, and in some cases a sufficient demand for firewood and inferior building wood may spring up. But in the more remote localities the demand for charcoal, fuel, and inferior building wood is exceedingly limited, and large areas will remain where a dense and luxuriant forest is growing up under present efficient protection, in which teak and the other valuable timbers form only a small proportion. The grassy glades and other blanks in these forests are rapidly filling up with dense forest, but in those places a large proportion of the material now growing up will be a burden and a source of difficulty hereafter, when a rational system of management and working is attempted.

The only mode of utilizing this abundance of wood in some of the more remote portions of the reserved forests of the Central Provinces, which I can devise at present, is by means of iron-smelting with charcoal. Iron-making existed, and still exists on a small scale, in the vicinity of some of the reserved forests, particularly in Bijerághogarh, those parts of Bálaghát which adjoin the Mandla district, and near the Moharli forest of Chánda. But iron ore is found, and traces of former iron-smelting exist, in many other localities besides. The increased cost of charcoal, which was the necessary consequence, at the outset, of a strict protection of the reserved forests, has probably in some cases been the chief cause of the cessation of the charcoal iron industry; but as the forest growth in these reserves increases, the material for charcoal-making will become abundant, and the cost of charcoal should be no obstacle to the revival of the iron industry.

* * * * *

There are other parts of India where similar operations might with great advantage be undertaken; and I would specially mention the forests in some parts of the North-West Himalaya where deodar is as yet the only wood that can be utilized on a large scale, and where it is most desirable to develop a demand for the wood of oaks and the other coniferous trees which are associated with deodar. The only other plan to utilize the woods of the other conifers would be by impregnating them with antiseptic salts, so as to make them more durable. The question of iron-making by means of charcoal is one of great importance for the development of rational forest management in India; and if we succeed in establishing an improved system of producing wrought iron in small furnaces by means of charcoal, we shall have accomplished a task the importance of which for forest management in India, and generally for the development of the resources of many naturally poor districts, can hardly be overrated. The old Native iron industry has for many years past gradually declined in most

places, partly because imported iron has been cheaper, and partly because the forests have become exhausted under a reckless and irregular system of cutting and burning. Wherever fire protection has been established in the Government forests, the difficulty arising from the scarcity of wood has now been removed. An abundance of wood is now growing up, and both the forests and the interests of the population in the vicinity will profit if the wood now produced in such abundance can be utilized for the manufacture of iron.

It may here be mentioned that I have entertained the plan here sketched for years, and that while in England on leave in 1872-74 I discussed it with eminent metallurgists, both practical and men of science, and that I have received every encouragement. I have been told on the best authority that if we can succeed in establishing something like the Spanish (Catalan) process of iron-smelting in small furnaces—in fact, if we can succeed in improving the present Native process—charcoal iron industry may yet have a future in India.

No action, however, has yet been taken on these suggestions. Although the manufacture of iron with charcoal is an old established practice in many districts of India, yet the idea of stimulating and reviving this industry, in order to utilize the wood of the so-called inferior species, is novel, and it will be some time before it gains acceptance.

No doubt the Native process of making wrought iron directly from the ore is exceedingly wasteful, and it may be doubted whether this mode of utilising the inferior kinds of wood will leave any margin of profit. But even if no profit were realized, the main object—to make room for the more valuable species—would be gained.

Durable woods more valuable.

6. The chief reason why certain woods are less valuable than others lies in this, that in the climate of India they perish in a short time through rot or the attacks of insects. Thus, of all the numerous pines of the North-West Himalaya, there is only one kind, the deodar, which is sufficiently durable to be used in the plains. Of the other species the most important are the Chír (*Pinus longifolia*), the blue Pine (*Pinus excelsa*), the Spruce (*Abies Smithiana*), and the silver Fir (*Abies Webbiana*). The wood of some of these is used in the plains, but only on a small scale; and for certain purposes, such as railway sleepers, they are of very little value.

Inferior woods may be made durable by impregnation.

7. Hence naturally the idea was started to make the inferior woods more durable by impregnating them with antiseptic substances. The chief competitors of Indian railway sleepers are sleepers of iron and of Baltic pine impregnated with creosote. Owing to the present exceedingly low prices of Baltic timbers in England, these impregnated sleepers compete successfully with sleepers of teak, sâl, and deodar produced in the Indian forests; and it is not unreasonable to suppose that impregnated sleepers of the Himalayan pines will be found as durable and useful as sleepers of similar woods imported from Europe. The main difficulty consists in this, that creosote, which is the most effective antiseptic substance, is as yet an expensive article. It is not manufactured in India, and, as regards transport by sea, it is a cargo which is objected to by most vessels.

Metallic salts suggested for impregnation.

8. Plans were therefore framed to use metallic salts (sulphate of copper, chloride of zinc, or corrosive sublimate) instead of creosote. The subject of establishing factories for impregnating the so-called inferior pines of the North-West Himalaya was studied by Dr. H. Warth, then Collector of Inland Customs. Two reports by Dr. Warth—one, of October 1875, on the impregnation of railway sleepers generally, and the other, of September 1878, on the establishment of a factory for impregnating pine sleepers from the North-West Himalaya with metallic salts—were printed and circulated, as well as a memorandum by the writer of the present review on the supply of railway sleepers of the Himalayan pines impregnated in India. In these reports definite proposals for the establishment of factories for impregnating sleepers floated down the Jumna and Ganges rivers were submitted to Government.

Proposals made.

9. The substance of these proposals appears from the following extract from the paper last mentioned :—

In June 1877 the Government of India, in the Public Works Department, suggested special consideration of the subject of the supply of indigenous timber for railway purposes; as at that time it was supposed that the war in Europe might possibly interfere with the supply of sleepers for railways in India.

2. The result of the enquiries then made, and of all the information which was previously at the disposal of the Government of India, is that the supply of timber sufficiently durable for railway sleepers in India is not sufficient at present to meet the requirements for construction

and renewals, and will not be sufficient until the forests in charge of the Forest Department have grown up, and this will not be for a long series of years.

* * * * * * *

6. Speaking broadly, it must be acknowledged that, in considering the supply of indigenous timber for railway purposes, we must limit our enquiries to teak, sâl, and deodar.

Large supplies of teak timber for railway purposes can at present only be expected from Burma, the forests of North Kanara, and to a smaller extent from the forests in the south-eastern districts of the Central Provinces, Bastar and other Native States adjoining them. But the high price which teak commands will always prevent its being used, except locally, on any large scale for railway sleepers. Teak sleepers are, and will doubtless chiefly be, used on railways in Burma, and to a small extent on some of the lines of South and Central India, as well as in Bengal, a short distance inland from Calcutta. But for the great Railway system of Northern India teak sleepers cannot be thought of.

7. The supply of mature sâl timber in the forests under the control of Government is very limited at present. The sâl forests of Bengal are expected eventually to yield a very large annual outturn, and may, 50 years hence, be found sufficient to supply the requirements of all railways in Lower Bengal; but at present large cuttings are not possible. The forests in the eastern districts of the Central Provinces will furnish sleepers for renewals on the lines within easy reach of Jubbulpore, and perhaps for the line intended to be built eastwards from Nágpur.

8. The sâl forests in the Sub-Himalayan tract of Oudh and the North-Western Provinces do not contain mature timber enough to do more than supply local demands, and cannot, for many years to come, be depended upon for large supplies of railway sleepers.

The only extensive sâl forests which can be expected at the present time to furnish large supplies of railway sleepers are those in Nepal; the authorities in charge of these forests are most anxious to develop the export of timber, which can be floated down by the numerous feeders of the Sárda, the great Gandak, and the Ganges rivers, and the railway authorities will do well to utilize this source of supply to the utmost. The supply from this source ought to furnish renewals for a portion of the Oudh and Rohilkhand lines and for the East Indian Railway below Allahabad, and sleepers for construction of provincial railways in Lower Bengal.

9. As regards deodar, matters are similar. The quantity of mature timber in the forests, leased and British, under the control of the Forest Department of the Punjab and the North-Western Provinces is very limited, and has been so much diminished by heavy fellings to supply sleepers for the Rajputana and Punjab lines that cuttings must, for many years to come, be reduced considerably, and no considerable supply of sleepers can be expected from that source. Small quantities may be obtained from Native States between the Beas and Tons rivers, the forests of which are not leased by Government; but the largest supply must be expected from Kashmir. The deodar forests in that State should be drawn upon largely for the extension of the Northern Punjab State Railway, and they may furnish renewals for the Sind, Punjab, and Delhi and part of the Indus Valley Railways.

10. These are the chief sources of indigenous sleeper-supply. It will be understood that I have purposely limited my remarks to general results, but they can be relied upon for practical purposes. Small supplies of durable sleepers may here and there be obtainable otherwise, but the sources mentioned are the only ones which can be depended upon for large quantities.

11. At the present time, I understand no difficulty is experienced in the supply of sleepers for construction and renewals on the State Railways and guaranteed lines. Both iron and creosoted pine sleepers are obtained in sufficient quantities, and at exceedingly low rates, from Europe at the present time.

Thus with the supply from Europe, and the existing indigenous sleeper-supply, the present requirements of the railways are fairly met. But these sleeper requirements must increase on account of the contemplated extensions, and the increase of renewals on the older lines. The renewals on the East Indian Railway alone fluctuate between 150,000 and 200,000 broad-gauge sleepers annually, and will soon reach 200,000 sleepers a year. It would probably be an advantage to that line if the renewals of the upper portion above Allahabad could be provided from indigenous sources.

12. Even with the present cheap rates and the abundant supply of sleepers from Europe, there must be a portion of the inland districts of North India for which it would be desirable to have a supply of sleepers on the spot from the Himalayan and Sub-Himalayan forests. I am aware that it is considered desirable gradually to substitute iron for wood sleepers throughout India, and that it is hoped that the Bengal Iron Works will be equal to supply a very large proportion of the sleepers that will be required by railways in India. But, whether the iron sleepers come from England or from Bengal, there must be certain lines in the inland districts of North India for which it would be both convenient and economical to have local sources of sleeper-supply.

13. And in an undertaking of such magnitude and rapid growth as that of the Indian Railways, it certainly will be prudent not to rely upon one source of supply alone, but to have a second source of supply to fall back upon, and thus to leave a broad margin for accidents and unforeseen contingencies.

14. Almost simultaneously with the construction of the first railways in India, the idea was started of increasing the durability of Indian woods by impregnating them with antiseptic substances. The experiments made in this respect have been numerous, and an account of them is given in paragraphs 21 to 40 of Dr. Warth's report of September last.

The results have not thus far been satisfactory; nevertheless the impregnation of indigenous timber with antiseptic substances is the chief measure by which, for certain districts of North India at least, the supply of durable indigenous sleepers can be considerably increased

15. In a report submitted to Government in January 1863, on the supply of indigenous sleepers in India, I drew attention to the necessity of testing the Himalayan pines in a systematic way as regards their impregnation with antiseptic substances; and I then said "the question is one of experiment, and the sooner this experiment is made on a sufficiently large scale, the better."

16. In a later report, on the same subject, of April 1870, I submitted my views on this subject as follows:—

'To supplement the supply of woods which are naturally durable, it will be necessary, I believe, to undertake, on a large scale, the impregnation of the inferior pines with antiseptic substances. The species which I have mainly in view, and of which there are extensive forests, either leased or British, are the following:—

(1) *Pinus longifolia.*
(2) *Pinus excelsa.*
(3) *Abies Smithiana* (Himalayan spruce).
(4) *Abies Webbiana* (Himalayan silver fir).

'The larger portion of the forests of these kinds are at present without any value, there being no considerable demand for these woods; and any measures that will increase the demand will, in many ways, have a beneficial effect upon the management of the forests. For instance, in those tracts where the deodar is mixed with the inferior pines, the forests cannot be worked in a satisfactory manner if felling operations are limited to deodar; and in other parts, it will not pay to make roads and slides, unless a large quantity of timber is available for removal from one locality.

'In short, if we can manage to utilize the extensive forests of the inferior kinds of pines, it will be possible to place the working of the Himalayan forests upon a much more satisfactory footing. This is an advantage independent of increasing the supply of timber.'

17. In 1875 the Government of India placed Dr. H. Warth, Collector of Inland Customs, Mayo Salt Mines, on special duty to work up the information which I had collected regarding the impregnation of timber, and the result was a report on the subject, which was published in the *Indian Forester* of July 1876.

In 1876, when Dr. Warth was at home on furlough, he was, at the suggestion of the Government of India, directed by the Secretary of State to examine certain impregnation works in Germany and Austria, and particularly to report upon the experience gained in these countries regarding the durability of sleepers impregnated with chloride of zinc and sulphate of copper. His report, which was dated December 1876, was printed in England.

And in July of this year Dr. Warth was again, by the order of the Government of India, placed upon special duty, to prepare estimates for setting up works for impregnating the Himalayan pines with metallic salts. This last report is dated 11th September 1878.

18. As stated in paragraphs 28 and 29 of Dr. Warth's last report, a pneumatic apparatus for impregnating sleepers of *Pinus longifolia* with creosote was set up at Aligarh in 1868, and was worked successfully for some time. The creosote was imported from England, and its cost at the works is reported to have been from 4 to 6½ annas per gallon, not counting the cost of the iron tanks in which it is imported, and which, to the extent of the supply then obtained, were utilized or sold for full value. With a large steady annual supply of creosote, however, the disposal of these tanks for full value would be difficult, and this would increase the cost of creosote considerably. Even at the rates mentioned, the cost, reported from one rupee to two rupees two annas per sleeper, would, as a rule, be prohibitory. For the present, therefore, the idea of using creosote must be given up, though it is not impossible that hereafter it may be manufactured in India. The next best substitutes for creosote are certain metallic salts, *viz.*, corrosive sublimate, sulphate of copper, and chloride of zinc. The result of the experience regarding the preservative powers of these substances is recorded in the three reports submitted by Dr. Warth on the subject, and particularly in paragraphs 10 to 18 of the memorandum of September last. There is every reason to believe that those substances will prove effective in India, provided the processes are applied with due care and with due consideration of all circumstances, particularly as regards the drying of the sleepers after impregnation. Regarding the cost of the process, reference is requested to paragraphs 41 to 58 of Dr. Warth's present report, which shows that with an annual outturn of 200,000 sleepers, the cost, including the cost of the metallic salts, will amount to 8 annas per broad-gauge sleeper.

19. There is good ground to believe that it will be possible to deliver annually 200,000 sleepers, or a larger quantity of the species mentioned above, at the impregnating works, at rates varying from Rs. 1-8 to Rs. 3, and that it will be possible to sell the impregnated sleepers at the works at Rs. 3-8 a-piece all round. This estimate relates to broad-gauge sleepers; but it can only be maintained if the demand is steady, so that all operations can be arranged accordingly. A fluctuating demand and sudden irregular indents for the delivery of large quantities at short notice must always result in increased cost of the sleepers.

20. The question now arises, whether at the rate named there is any prospect of selling annually 200,000 broad-gauge, or their equivalent in metre-gauge, sleepers in North India.

In estimating the annual sleeper requirements of the lines in North India, it has been assumed that sea-borne sleepers can compete with indigenous sleepers to a distance from the port of from 500 to 600 miles. Thus, it has been assumed that the Rajputana line will be supplied with sea-borne sleepers as high up as Ajmere, and the Holkar and Neemuch lines as far as Neemuch. The Indus Valley line, the Great Indian Peninsula and the East Indian Railways have been entirely omitted from the calculations.

21. The following statement shows the length of lines in North India open on 30th June last, and those in progress on that date, all those lines or sections of lines which, it is presumed, can be supplied economically by sea-borne sleepers being excluded :—

Length of lines open and in progress on the 30th June 1878.

Lines of railway.	Open on the 30th June 1878.		In progress.	
	Broad-gauge.	Metre-gauge.	Broad-gauge.	Metre-gauge.
	Miles.	Miles.	Miles.	Miles.
Punjab Northern State Railway.	103*	.....	71	... ..
Muttra-Hâthras	.....	29	.....	.....
Rajputana (to Ajmere)	.....	400	.....	... ..
Scindia (to Gwalior)	34	.....	41	... ..
Neemuch (to Neemuch)	.....	.....	.....	133
Oudh and Rohilkhand (whole line)	544	.....	3	. . ..
Sind, Punjab, and Delhi Railway (to Mooltan) ..	553	.....	.....	... .
Total ...	1,234	429	115	133

22. The experience gained on the East Indian Railway justifies our estimating the life of a heart-wood sleeper of sâl at 11 years; but taking the sleepers now in use all round, 12 years may be taken as the average duration of sleepers. Accordingly, assuming one-twelfth as the annual figure for renewals, we have the following :—

Gauge.	Length of lines open on the 30th June 1878.	Requirements for renewals in length of line.
	Miles.	Miles.
Broad	1,234	103
Metre	429	36

In these estimates no renewals are included for the lines now in progress and not yet open for traffic.

23. As regards new constructions, we may assume that, during the next five years, 50 miles annually on the broad-gauge will be built in the Punjab and 100 miles on the narrow-gauge in the North-Western Provinces. If we add to this the renewals, we find the total annual requirements of sleepers in round numbers as follows :—

Gauge.	Miles.	Sleepers, per mile.	Total sleepers.
Broad	150	1,800	270,000
Metre	135	1,800	243,000
Total .	285	1,800	513,000

24. The following statement shows the cost of iron and wooden sleepers per mile imported by sea at the limits of land transport here assumed. The cost of the land transport is estimated

* 103 miles, metre-gauge line, open on 30th June. The broad-gauge line, 103¼ miles, was opened on 6th October 1878.

at Rs. 15 per ton for 500 miles, which is equal to $\frac{1}{67}$ pie per maund per mile. This is rather too low an estimate, but it is adopted here in order to be on the safe side.

Cost of imported sleepers per mile of line at sea port and up-country.

Sleepers of iron and wood imported from England at present prices, per mile of single line.	Iron pot sleepers.		Creosoted pine sleepers.			
	Broad-gauge.	Metre-gauge.	Broad-gauge	Metre-gauge.		
Weight of sleepers in tons.	146	66	125	55		
A.—Cost at seaport.	Rs.	Rs.	Rs.	Rs.		
(reported present rates) ...	12,000	5,496	4,730	2,606		
B.—Transport by rail—	Rs.	Rs.	Rs.	Rs.	Distance *viâ*	Miles.
to Mooltan ...	2,650	1,198	2,269	980	Indus Valley and Sind Railways	605
„ Ajmere ...	2,667	1,206	2,284	987	Bombay, Baroda, and Central India and Western Rajputana Railways.	609
„ Neemuch ...	2,615	1,182	2,238	967	Great Indian Peninsula and Holkar Railways.	597
„ Jubbulpore ..	2,694	1,217	2,306	996	Great Indian Peninsula Railway	615
„ Allahabad ...	2,470	1,117	2,115	914	East Indian Railway from Howrah	564
A + B.—Cost of sleepers per mile of single line—						
at Mooltan ...	14,650	6,694	6,999	3,586		
„ Ajmere ...	14,667	6,702	7,014	3,593		
„ Neemuch ...	14,615	6,678	6,968	3,573		
„ Jubbulpore ...	14,694	6,713	7,036	3,602		
„ Allahabad ...	14,470	6,613	6,845	3,520		

25. It has been stated above that it will be possible to deliver broad-gauge impregnated sleepers at the impregnating works for Rs. 3-8 per sleeper. At 1,800 sleepers per mile, this would amount to Rs. 6,300 per mile. It will be explained further on that the works will probably be set up near Delhi on the Jumna, and at Rájghat on the Ganges river; and it is obvious that from these points, or from points similarly situated, sleepers at Rs. 3-8 a piece (broad-gauge) will, even at the present low prices, compete successfully against sea-borne sleepers.

And it may be assumed as certain that creosoted pine sleepers will not long continue to be imported at the rate of Rs. 2-8 per broad-gauge sleeper, but that the rate will again approach the usual one of Rs. 4.

26. Under these circumstances, it may reasonably be expected that the lines mentioned, the annual sleeper requirements of which during the next five years have been estimated at 270,000 broad and 243,000 narrow gauge, will be chiefly dependent upon the supply of indigenous sleepers, and these are, as already explained, the following :—

(1) Sâl sleepers from Nepal.
(2) Deodar sleepers from Kashmir.
(3) Impregnated pine sleepers from the Jumna and Ganges rivers.

It cannot be expected that sâl and deodar sleepers (broad-gauge) will ever to any large extent be delivered at Rs. 3-8 per sleeper; they will always command from Rs. 4 to Rs. 5 delivered on the line.

Therefore, it is likely that at the rate mentioned (Rs. 3-8) there will be a certain demand during the next five years for at least 200,000 broad-gauge, or the equivalent in narrow-gauge, sleepers a year. And it is obvious that a rise in the cost of sea-borne sleepers, and any increase in the import trade up-country which will raise the cost of carrying sea-borne sleepers inland, must necessarily increase the demand for indigenous sleepers.

27. It is impossible now to predict whether the pine sleepers proposed to be impregnated with metallic salts will attain a durability equal to that of sâl and deodar sleepers or of creosoted pine sleepers imported from England. This is the chief element of doubt in the matter; but the experience gained on this subject in Europe justifies the assumption that the difference in the life of creosoted sleepers and of sleepers properly impregnated with the metallic salts named will not be very considerable.

Orders passed by Government on these proposals.

10. A reference made on these proposals to the different railway administrations led to the result that at present the supply of railway sleepers, both for construction and maintenance, is ample, and that no action need be taken for the establishment of a factory and the supply of indigenous impregnated sleepers. The following is an extract from the orders issued on the subject by the Government of India, bearing date the 17th September 1879 :—

2. The opinions of the several railway administrations in India were asked for regarding the proposal to employ sleepers of the Himalayan pines impregnated in India, and the following is the substance of the reports received :—

The railways of Lower Bengal, as well as those of Western and Southern India, having their termini at or near the seaports, obtain creosoted fir sleepers from Europe at such a low price that the cost of carriage of impregnated sleepers from the Himalayan forests would prove prohibitory. The Oudh and Rohilkhand Railway is laid throughout with iron sleepers.

Of the Sind, Punjab, and Delhi Railway, more than half of the line is laid with pot sleepers, and the Company's Chief Engineer is of opinion that, should the market keep low, it will be economical eventually to replace the existing wooden sleepers by iron.

3. The question is thus much narrowed, and resolves itself into one which chiefly concerns the East Indian Railway and the State Railways of Northern India.

The Agent and Chief Engineer of the East Indian Railway Company is of opinion that Chír (*Pinus longifolia*) unimpregnated is useless for sleepers. Impregnation with creosote was fully tried for some years at Aligarh, but was ultimately abandoned as unprofitable. The process was by some believed to prolong slightly the life of the sleeper, but the porous nature of the chír caused it to absorb so much creosote that the cost was found prohibitive.

Impregnation with metallic salts may also prove too expensive, and it is not likely to materially enhance the value of the wood for sleepers. The Agent states that the use of chír for sleepers has long since been discontinued on the East Indian Railway, and he declines to give it a further trial.

4. As regards the State Railways of Northern India, the Engineer-in-Chief and the Manager of the Punjab Northern State Railway concur in the opinion that an ample supply of first-class deodar broad-gauge sleepers are and will continue to be procurable at Wazírabad at a cost of Rs. 3-6 each.

On the Indus Valley State Railway, impregnated sleepers from the Himalayan forests could not compete with the cheaper creosoted fir from Europe *viâ* Kurrachee.

When the Rajputana Railway is open through to Bombay, creosoted fir sleepers will be procurable at a price which will preclude the use of impregnated chír from the Himalaya.

5. The Chief Commissioner of the Central Provinces fears that he will be unable to support the proposed factories in Northern India, as the Forest Department of those Provinces has undertaken to supply teak and sâl sleepers at Rs. 3-4 and Re. 1-12 each, respectively, delivered along the lines of railway now under construction.

6. Under these circumstances, the Governor General in Council is of opinion that no further action need at present be taken for the establishment of a factory and the supply of indigenous impregnated sleepers.

The different kinds of sleepers, of which it is said that abundant supplies are available, leave nothing to desire on the score of durability. Iron sleepers have answered well in the drier parts of the country. Creosoted pine sleepers from England, if completely impregnated, have been found to last more than 20 years on Indian lines. The life of sâl heart-wood sleepers on the East Indian Railway has been found to be 14 years, and sleepers of teak may be assumed to last as long as those of creosoted pine. Regarding the life of deodar heart-wood sleepers no certain data are as yet available, but it is probable that, as a rule, they will not last longer than sâl sleepers. Besides the kinds mentioned in the extract here quoted, there are others equally durable, which are used on a large scale. Of these the chief is the Burma iron-wood or Pyinkado (*Xylia dolabriformis*), which has been used largely on the Rangoon and Irrawaddy Valley State Railway and on some of the lines in Lower Bengal. Another very durable wood is Anjan (*Hardwickia binata*), which, owing to its extreme hardness, was not formerly cut extensively, and of which, therefore, a considerable stock of old trees still remains in several forests of the Nimar district and in other forests of the Central Provinces and Berar. Sleepers of this wood have as yet only been laid down on the Holkar and Neemuch State Railway.

Sleepers of inferior pines extracted largely from the forests.

11. Under these circumstances, it might have been expected that no difficulty would be experienced in always procuring sufficient supplies of excellent railway sleepers for all the Indian lines, either in India or from Europe, and that there would be no necessity for using any of the less durable or inferior woods for this purpose. It is, however, a remarkable fact that for

several years past large quantities of railway sleepers of the inferior pines, chiefly of *Pinus longifolia* and *Pinus excelsa*, have been cut in the North-West Himalaya and have been exported to the plains.

These sleepers are cut by timber traders in Native States, chiefly near the Sutlej river, and, as far as is known, they are not impregnated with antiseptic substances before they are laid in the lines. It is not likely that these sleepers are accepted as deodar by the railways, as the wood is easily recognized; the only likely conclusion, therefore, is that the Railway administrations find it advantageous to use a certain quantity of the less durable kinds.

Future prospects of the supply of deodar for the railways of Northern India.

12. At the same time, it must be borne in mind that the deodar forests of Kashmir, although very extensive, must necessarily become exhausted under the present reckless system of working, and that the deodar forests in other Native States, which have not been brought under the control of Government by means of leases, will within a few years have been cleared out of all marketable trees.

It is true that the resources of this valuable tree in British territory, and in the leased forests of Chamba, Bashahr, and part of Tiri-Garhwál, are more carefully preserved, and that they are steadily improving. But the extent of these forests is limited, and the more accessible among them had been worked heavily and were in an impoverished state when taken charge of by the Forest Department. It is not likely that, with all the care which may be bestowed upon them, these forests will be in a position to furnish the whole of the deodar timber that may be required for railways and for other purposes in Northern India, when the deodar resources of Kashmir and of other Native States have been exhausted.

Conclusion.

13. Under these circumstances, it is not at all impossible that when the Railway administrations discover the inconvenience of using sleepers of woods which are not durable, the project of impregnating them with antiseptic substances may yet be resumed, and may open up a demand for certain of the trees, at present valueless, which are associated with deodar. Any circumstances which may interfere with the importation of sleepers from Europe will have a similar effect.

Two classes of forests in regard to the extent of demand for their produce.

14. The preceding remarks will serve to explain that, in regard to the nature and extent of the demand for their produce, the forests under the control of Government for purposes of conservancy may be divided into two great classes—those in which there is a sufficient demand for the whole of the produce, and those in which the demand is limited to a certain portion of the produce and, in many cases, to the timber or other produce of one or a few valuable kinds only. The forests of the first class are as yet very few.

As already explained, those forests in which every stick can be utilized are more commonly found in the dry and arid parts of India. Thus in regard to the plains of the Punjab, it may be said that where forest or brushwood exists, whether natural or planted, there is generally a sufficient demand for all the produce which such forest is capable of yielding under proper conservancy management. In the hills of the Punjab and in other parts of India with a climate more moist and a forest vegetation more luxuriant, a sufficient and equable demand for all descriptions of wood and other produce is only found in certain instances.

The Darjeeling forests are instances of the first class.

15. The forests near Darjeeling have already been mentioned. The present annual supply required by that station and the tea plantations in its vicinity is estimated at 500,000 cubic feet of solid wood; and for the supply of this quantity 9,384 acres of forest land are at present available, and by the construction of additional roads this area may be increased to 12,257 acres. If the whole of this area were completely stocked, and if the reproduction of the forest were uniformly good, 500,000 cubic feet would not be a large yield for 12,257 acres, as it would amount to only 40 cubic feet per annum per acre. But of the total area, 2,585 acres are situated at an elevation above 7,500 feet, and in the damp climate of the Darjeeling hills the regeneration of the forest at this elevation is exceedingly slow and uncertain; and of the remainder a large portion is imperfectly stocked. Here then is a case where the most careful and skilful management is required in order to ensure the requisite annual outturn permanently from this forest.

Other instances.

16. In a similar position are the forests which supply Naini Tal and the stations of Ránikhet and Chakráta in the North-Western Provinces with timber, fuel, and charcoal. These forests also are of limited extent, and the whole of their produce will be required to satisfy the demands of the stations which depend upon them for their supply.

The Holkar and Neemuch State Railway is one of the few Indian Railways which still burn wood. The total length of the line will be 388 miles, and the annual consumption for the entire length is estimated at 40,000 tons. Of this quantity it will probably be necessary that the Punassa reserve should furnish 30,000 tons a year, unless it should after all be decided to burn coal instead of wood. The area of this forest is about 91,000 acres, so that the quantity mentioned would amount to an annual yield of 16 cubic feet per acre. This would be a very small yield under ordinary circumstances, but the forest is imperfectly stocked, and the climate is hot and dry. Difficulties, therefore, there are, but these difficulties can be overcome by skilful management, provided all kinds of wood produced are used as railway fuel, and it would be an advantage if the produce of this forest could be utilized for supplying the line.

System of management must be regulated by the extent of the demand.

17. Those forests in which there is a complete demand for all descriptions of forest produce can and must be managed in accordance with a regular system, analogous to that under which the great public forests on the continent of Europe are managed. Such forests, therefore, are of special value for the development of systematic forestry in India and for the instruction of students in forestry. But it does not follow that the management of those forests in which the demand is partial should not require skill and system. On the contrary, the management of mixed forests, which contain one or a few kinds only of valuable trees in a large mass of forest which cannot be utilized, is far more difficult than the management of forests in which all species are valuable.

Thus the management of the Burma teak forests, which are expected to yield a certain annual quantity of teak timber, though there is no demand at present for most of the other trees with which teak is associated, is an exceedingly difficult task; for it is of the utmost importance not to impair the condition of these forests as regards the production of teak: on the contrary, it is necessary steadily to increase the proportion of teak in the Burma forests, with the view of enabling them in future to keep up the supply of this timber for the world's trade and for consumption in the province at a time when the imports from beyond the frontier shall have diminished.

Consumption of firewood less in India than in Europe.

18. What has been explained in the preceding paragraphs must not be misunderstood. It has been said that the demand in regard to the produce of certain forests is incomplete; but this must not be held to mean that the forest area is in excess of the demand. The point is that there is a demand only for certain classes and descriptions of forest produce, while there is no demand for the remainder. Thus in the sub-Himalayan forests of the North-Western Provinces, between the Jumna and Sárda rivers, there is a sufficient demand for sál timber of certain dimensions, for the timber of Sandan (*Ougeinia dalbergioides*), Khair (*Acacia Catechu*), and a few other kinds, and for bamboos. This demand it is by no means easy to meet without straining the resources of the forests in this particular respect, but the demand is partial and does not extend to the whole produce of the forests. This feature constitutes the chief difference between the forests in India and those on the continent of Europe; and one of the principal reasons is that the consumption of firewood is less in India than in Europe.

Price of firewood high in certain places.

19. And yet the price of firewood is high in many districts, and not only in those which are situated in the dry and arid parts of the country. Appended to this review is a statement showing the price of firewood during the three years 1878, 1879, and 1880 in 47 districts, and it will be noticed that the rates were highest at the following places:—

Bombay	Rs. 16 to 20 per ton of	2,240 lbs.
Rájkot	Rs. 18 to 22	ditto.
Ráwalpindi	Rs. 15 to 27	ditto.
Amráoti	Rs. 20 to 24	ditto.

The statement has been prepared from the monthly returns of the prices of food-grains and other ordinary articles of consumption recorded in the *Gazette*

of India. The figures of these returns are not probably accurate in all cases, but they give a sufficiently fair idea of the actual state of things.

The supply of fire-wood how to be increased.

20. The object in recording these figures is to show that there is room for useful work in providing a cheaper supply of firewood at certain places, and this must chiefly be done by demarcating and placing under special protection lands capable of producing fuel, situated in the vicinity of towns and districts where fuel is scarce and expensive. At Ráwalpindi successful efforts have of late years been made by the Conservator of Forests in the Punjab to meet the difficulty by establishing depôts for the sale of firewood, which is supplied by direct Government agency.

At Amráoti firewood ought not, under good management, to be expensive. There is a large extent of hills in the vicinity of the town, mostly at the disposal of Government, which, if placed under systematic management, would furnish an ample supply of fuel for the town and district. Detailed proposals regarding the management of these hills were submitted in 1878 by the writer of the present review, and in the Berar Forest Report for 1879-80 it is stated that action has been taken to carry out those proposals.

Enquiries were also made in the Agra and Etáwah districts during the year under review, by the Conservator of Forests of the Central Circle in the North-Western Provinces, regarding lands that might be placed under conservancy management for the supply of grass and fuel. These enquiries have not, however, as yet led to any definite result.

Particularly in agricultural districts

21. Although, therefore, the provision of firewood does not play so important a part in the management of forests in India as in Europe, yet a large portion of the produce of certain forest tracts is utilised as fuel; and it is, as a matter of course, most desirable that, particularly in agricultural districts, ample supplies of firewood should be made readily available to the people, and that the manure which at present is used largely for fuel (not for cooking only, but also for sugar-boiling and other industries) should be utilised for its legitimate purpose, that is, for manuring the fields.

Increased production of grass.

22. Not only, however, does the provision of firewood come within the legitimate scope of forest administration in India, but one of its most important duties will in future be to increase the supply of cattle-fodder, particularly during seasons of drought in the drier districts. The importance of this feature of Indian forest administration has by no means yet been sufficiently recognised. It has been explained in reviews of previous years that on the bare and dry hills of Ajmere and Merwara an area, aggregating 100 square miles, has been demarcated and placed under strict protection, and that these operations were undertaken, in the first instance, with the view of improving the water-supply in tanks and wells, upon which cultivation in these districts chiefly depends. The principal advantage, however, which has manifested itself up to date, as the result of these operations, is that the supply of grass has increased largely. The conditions under which these reserves are established permit the people in the vicinity to cut grass in them, and during several seasons of drought which have occurred, the increased supply of grass, under the shade of the trees and brushwood which have grown up under protection, has been extremely useful.

Operations should be extended.

23. These reserves in Ajmere are only a beginning on a small scale, and operations of a similar character should be undertaken in all districts which are situated in the dry and arid zones of the country.

It is in this manner chiefly that forest conservancy may be expected to mitigate the disastrous effects of seasons of drought and famine. The importation of grain can be facilitated by the construction of additional roads and railways, but cattle-fodder cannot to the same extent be distributed over the country; it must either be produced on the spot in the vicinity of the villages, or the cattle must be driven away to places where pasture is available. The want of grass, and the consequent mortality among cattle, has always been one of the principal evils attending famines in the drier districts of India, and this evil can in many cases be mitigated by forest conservancy.

Forest and grass preserves must be established in the midst of the open country.

24. At present it is the universal practice for the cattle in times of drought to be driven up into distant forests for pasture. Thus the cattle of the Doáb and other portions of Northern India go up in bad seasons to the forests at the

foot of the Himalaya; while those from the dry inland districts of the Deccan and Southern India are driven to the forests in the vicinity of the Ghât line. The measures here advocated contemplate the establishment of forest reserves in the heart of those districts, on the waste lands and dry hills which are of very little use at present.

Grass and wood preserves are old established institutions.

25. It must not be thought that this is a novel idea, of foreign origin. Village grass preserves ("ghain" or "ghasni" in the hills near Simla) are an old institution in many parts of the North-West Himalaya. No grazing is permitted in those areas, they are carefully protected, and in autumn the grass is cut and stored. Without them the cattle could not be maintained during winter.

In most of the States in Rajputana extensive preserves of forest and brushwood are maintained according to ancient custom, either as the property of the State, like the Ramnas of Bhurtpore and Kishengurh, or as the property of the great Nobles, who own a large portion of the land in Meywar. During the terrible famine of 1867 and 1868, while the cattle of the British districts of Ajmere and Merwara died or had to be sent away, these preserves in several of the Native States of Rajputana were of the greatest value in enabling the people to keep a portion of their cattle near their villages.

Effect of mere protection.

26. In all except the most arid tracts, or where denudation has been complete and of long standing, mere protection, aided by sowing and planting in suitable places, has the effect of gradually clothing the ground with trees and shrubs. What happens is this:—the old stumps and roots in the ground produce shoots; seeds which have been lying in the soil, and seeds brought by the wind, germinate; the shoots and seedlings, which without protection would have been destroyed by the fire or eaten by the cattle, grow up, and wherever there are sufficient remains of the old forest growth in the ground the result is most remarkable. The difficulty consists in this, that new reserves must be formed, and that during the first few years this unavoidably entails some restrictions in the matter of grazing. At first the protection of the areas selected must be absolute, and the people in the vicinity can neither be permitted to burn the grass, nor graze their cattle in these areas. But the grass which grows up abundantly can be cut, and thus furnishes abundant cattle-fodder until the forest is sufficiently advanced to admit of grazing.

Other advantages of protection.

27. When hills previously bare are thus clothed with forest growth, other advantages are secured besides an increased supply of cattle-fodder, and these are that the surface soil is fixed and that the water-supply in tanks, wells, and springs is increased. And when such operations, combined with sowing and planting, are undertaken in the plains, there is good ground to believe that they will exercise a beneficial influence in diminishing the formation of *reh* and the efflorescence of salt generally on the surface.

Apart from the districts of Ajmere and Merwara, where experiments in the direction here indicated were first commenced, the protection of selected areas of bare hills is chiefly needed in the drier districts of North-Western India, including a large portion of the Doáb, and in the Deccan and the dry inland districts of South India. Some progress has been made in this direction in some of the Deccan districts of the Bombay Presidency, where large areas of dry hills have been placed under protection. But, generally speaking, the progress made hitherto in this direction has been very small. The experience of the late famine in South India ought to be a warning to take timely steps to mitigate the effects of the next season of drought, which is sure to come sooner or later.

CHAPTER I.

RESERVED AND LEASED FORESTS.

Area and Boundaries.

28. The following was the area of the demarcated reserves at the commencement and close of the year, as entered in the provincial reports :— Summary.

Province.	Area of Reserved Forests on		Legal authority under which forests have been reserved.
	1st April 1879.	31st March 1880.	
Bengal	2,967	2,945	Indian Forest Act, 1878.
North-Western Provinces and Oudh ...	3,260	3,279	Ditto ditto, and lease from the Garhwál State.
Punjab	791	795	Indian Forest Act, 1878; Hazára Forest Regulation, 1873; lease from Native States.
Central Provinces	2,501	2,535	Indian Forest Act, 1878.
British Burma	1,410	1,612	Government Forest Act, 1865, and Act VII of 1869.
Coorg	295	220	Government Forest Act, 1865.
Ajmere	100	101	Ajmere Forest Regulation, 1874.
Assam	1,983	2,015	Indian Forest Act, 1878.
Total ...	13,307	13,502	
Mysore	454	454	Forest Rules, 1869.
Berar	1,366	1,388	Forest Rules, 1871.
Grand Total ...	15,127	15,344	

Classified according to the legal authority under which these areas have been constituted reserved forests, they stand as follows :—

	Square miles.
Under the Indian Forest Act, 1878	11,076
„ Government Forest Act, 1865, and Act VII of 1869 ...	1,832
„ Local Rules, Hazára	236
„ „ Ajmere	101
„ „ Mysore	454
„ „ Berar	1,388
Leased Forests	257
Total	15,344

Thus, although there has been an increase of the area, it has not yet attained the figure which it had before the Indian Forest Act took effect.

29. In Bengal the Rohtas, Rehul, and Bans-i-koh forests, in the Shahabad district, have been excluded from the reserved area, and small additions have been made to the forests in the Duars. The result is a small decrease in the area. Bengal.

30. In the North-Western Provinces and Oudh the small increase of 19 square miles is due partly to corrections in the area, partly to the transfer to the Forest Department of certain resumed waste-land grants in the Kheri district, and to the lease of certain forests in a small tract of British territory in the Simla hills, on the Pabar river, which, though under the control of the Government of the Punjab, have, on account of their geographical position, been attached to the School forests of the North-Western Provinces. North-Western Provinces and Oudh.

31. In the Central Provinces a small increase of the area is the result of an addition of 25 square miles to the Bori forest in the Hoshangabad district, and of smaller additions to the Rajaborari, Saonligarh, and Khamapur forests in Hoshangabad and Betúl. Central Provinces.

32. In British Burma the work of demarcation was progressing actively during the year, the result being an addition of 202 square miles. Included in the total area of 1,612 square miles are several tracts, aggregating 170 square Burma.

miles, which have been assigned to the Karen inhabitants of the forests to carry on their toungya clearings. This has been found to be the most satisfactory plan of dealing with this difficult question. Throughout the forests of Burma are scattered numerous communities, chiefly of Karens, who carry on their well-known toungya cultivation by cutting the forest, burning it, and raising a crop of rice, vegetables, and cotton in the ashes. After reaping the crop the temporary clearance is abandoned, and grows up again, first into low and dense jungle, which afterwards gradually changes into forest. Another site is selected in the ensuing year for cutting and burning the forest, and in this manner successive clearances extend over very large areas. Before demarcation of the reserved forests commenced, the Karens cut their toungyas where they listed, sometimes remaining within a certain range of forests, but frequently wandering from one valley to the other. Certain restrictions upon cutting teak and destroying teak by fire were imposed by the forest rules, but these restrictions were not generally enforced, and the result was great injury to the forests.

In selecting areas to be permanently maintained as reserved forests, suitable tracts have been set apart for the Karens, and within these limits the Karens are permitted to cut toungyas without reference to the rules relating to teak. The only condition which is imposed is that no teak tree above 18 inches in girth must be cut or injured.

By this arrangement two important advantages are gained—*first*, a certain area of reserved forest is now free of all toungya cultivation; and *second*, the Karens remain in the forest, furnishing labour for forest work, guides to forest officers, and supplies for parties engaged on work in the forest. The plan of assigning separate areas to the Karens was first suggested by Major Seaton in 1873, and it has since then been carried out with great success by Mr. Ribbentrop, the Conservator of the Pegu Circle. As already mentioned, these Karen areas are included in the reserved forests. They are areas on which certain forest rights have been granted to the Karen inhabitants of the forest, but they remain under the control of Government as a portion of the reserved forests.

Coorg.

33. In Coorg the area as recorded shows a diminution from 295 square miles, or 189,166 acres, to 220 square miles, or 140,722 acres. The cause of this was, first, the exclusion of 5,118 acres, which have been given up for coffee plantations, and, secondly, the substitution of actual areas, as determined by the survey, for areas which had only been estimated. The survey, however, not having yet been completed, a portion of the area recorded is only estimated.

Assam.

34. In Assam small additions were made in the Goálpára, Darrang, and Nowgong districts.

Berar.

As explained in the review for 1878-79, the reserved forests in Berar consist of two classes, the areas of which on the 31st March 1880 were as follows :—

	Square miles.
State forests	817
Reserved district forests	571
Total ...	1,388

As compared with last year, the area of the State forests has been diminished by the transfer of the Kelapur forest to the class of reserved district forests.

Outlay on demarcation.

35. The outlay charged in the accounts of the year for demarcation was Rs. 46,620, the net area added during the year having been 217 square miles. Paragraph 39 of the review for 1877-78 suggested that in each annual provincial report a comparative statement should be entered, exhibiting the area added to the reserved forests during the last three years, and the outlay incurred upon demarcation and compensation for land and rights, and that these items be explained, so as to show approximately, as far as such is practicable, what outlay was incurred upon the maintenance and improvement of the boundaries, upon the demarcation of the reserves declared during the year, and upon the preliminary work connected with the selection and demarcation of forests that will be declared as reserved forests in subsequent years. No such information is given in the provincial reports, and nothing remains but to repeat the suggestion.

The outlay was heaviest in Burma (Rs. 12,603), where 202 square miles were added, in the Punjab (Rs. 9,036), and in Bengal (Rs. 8,714), where the additions made were insignificant.

Compensation for land and rights.

36. Under "Compensation for land and rights," Rs. 4,610 are recorded, of which Rs. 2,505 were expended in the North-Western Provinces and Oudh and Rs. 1,358 in Bengal. No information regarding the nature of these payments is given in the local reports.

It is obviously most desirable that all outlay which partakes of the nature of capital expenditure, such as outlay for demarcation and improvement of the forests and communications and buildings, should be fully explained in the annual reports.

Rent of leased forests.

37. The amounts charged in the accounts of the year for the rent of leased forests, and for payments to shareholders in forests managed by Government, were as follows:—

	Rs.
North-Western Provinces (for lease of forests in Tiri-Garhwál) ...	12,504
Punjab (including payments for the lease of the forests in Bashahr and Chamba, to shareholders in Kalesar, and half seigniorage on account of timber cut in the Hazára forests)	32,257
Assam	50
Berar (annual payment to Melghat Rajas).	17,120
Total ...	61,931

These payments fluctuate within very narrow limits. They are constant, or nearly so, in all provinces, except in the Punjab, where they are subject to slight fluctuations. During the last five years the totals have been:—

	Rs.
1875-76	55,872
1876-77	61,774
1877-78	62,814
1878-79	62,174
1879-80	61,931

The outlay this year was less than usual in the Punjab, and this was chiefly due to less payments made to the villagers in Hazára who receive a share in the forest revenue.

Object in leasing these forests.

38. The agreements, in accordance with which these payments are made, enable Government to exercise effective control over the forests in a large portion of the North-West Himalaya, *viz.*, in those of the Chamba, Bashahr, and Tiri-Garhwál States, and over the forests in the Melghat hills of Berar, and thus to ensure their management according to correct conservancy principles. Originally, the object in making these agreements was to ensure a permanent and sufficient supply of timber, chiefly deodar in the Himalaya and teak in the Melghat. But the beneficial effect of these measures is not limited to the production of timber for public works and the general requirements of the country.

These leases advantageous to the people of the countries.

39. In these leased forests the same principles of administration are followed, as far as practicable, as in those which are situated within British territory; and, where practicable, endeavours are made to separate the lands chiefly destined for the production of timber from those which are available for pasture and for the extension of cultivation. In this manner the supply of wood and timber is secured, and the systematic working of the forests provides at the same time permanent employment for the people in their vicinity.

Most of these forests, which are now carefully protected by the Forest Department and managed on a systematic plan, were formerly worked by timber traders in a wasteful and reckless manner; and as the local supply of labour was insufficient for the suddenly extended timber operations undertaken by these traders, they introduced labour from other districts on a large scale. Since, however, the care of these forests has been undertaken by the Forest Department, the timber operations have lost their fitful and irregular character. They are conducted with regularity on a more moderate scale, the aim being to extract the same, or nearly the same, quantity annually from each district. The consequence is, that local labour is employed more extensively than formerly, and that the people of the country find it profitable to come to these works.

Opposition against forest leases.

40. These, like other important measures connected with forest administration, have not been carried out without opposition. But it is a remarkable fact that this opposition has not in this case proceeded from the people residing in the vicinity of the forests, but from others who were either ignorant of the real state of things, or whose profits had been diminished by the introduction of a regular forest administration. The Chiefs of the States concerned derive the greatest benefit from these arrangements. For in the place of a temporary and fluctuating revenue obtained by the devastation of the forests, they have secured to them a permanent annual income and a steady improvement in the value of their estates.

The management of leased forests a good example to other States.

41. The good management of these leased forests has served as an example to other Native States in their vicinity. The Rana of Bajji and the Thakur of Madhan, whose States occupy the flanks of the Shali mountain, near Simla, have within the last few years prohibited the burning of the grass and forest within their States, and this prohibition is enforced by them; while in most of the adjoining States the forest and grass are burnt as heretofore. In that portion of Sirmúr and Patiála which is situated within the hills, a commencement in regular forest administration has also been made. The Chief of the small State of Dhámi, west of Simla, has for many years past maintained regular forest reserves, chiefly for the breeding of game, which are efficiently protected and are in a very satisfactory condition.

Protection from fire.

Summary.

42. As regards fire protection, good progress has been made in nearly all provinces: Coorg and Berar alone show a diminished area actually under protection.

Area of forests protected from fire in 1879-80.

Province.	Acres.	Outlay during the year.	Outlay on 1,000 acres protected.	Total outlay from commencement.	Date to which expenditure has been incurred.	Year when fire conservancy commenced.
		Rs.	Rs.	Rs.		
Bengal	423,105	11,334	27	18,284	30th June 1880	1872
North-Western Provinces and Oudh.	423,169	22,449	53	90,014	30th June 1880	1872
Punjab	...	...	...	..	...	..
Central Provinces	715,773	12,434	17	1,00,969	30th June 1880	1864
British Burma	96,418	8,837	92	63,626	31st May 1880	1857
Coorg	102,865	4,503	44	10,755	31st May 1880	1876
Ajmere	62,514	835	13	3,654	30th June 1880	1874
Assam	91,935	6,216	68	20,659	30th June 1880	1873
Total ...	1,915,774	66,608	...	3,07,961	...	...
Mysore	118,560	* 1,622	14	21,149	30th April 1880	1874
Berar	458,252	3,172	7	16,476	30th June 1880	1870
Grand Total ...	2,492,586	71,402	...	3,45,586	...	...

* Excludes money spent in protecting plantations from fire.

Assam and Bengal.

43. Owing to an exceptionally favourable season, with early and heavy rains in spring, fire protection was very successful in Assam and Bengal. The figures below exhibit the progress made in these provinces during the last three years:—

Year.	Bengal.			Assam.		
	Area in acres		Cost on 1,000 acres protected.	Area in acres		Cost on 1,000 acres protected.
	Attempted.	Protected.		Attempted.	Protected.	
			Rs.			Rs.
1877-78	122,728	78,834	25	89,761	60,028	63
1878-79	189,653	106,754	23	90,342	33,259	124
1879-80	447,836	423,105	27	92,605	91,935	68

Owing chiefly to the extensive and irregularly shaped belts and patches of moist ground in and near the forests, the task is peculiarly difficult in these provinces. But a good system has been set on foot, and what is now required is steady progress. The area placed under protection should not be increased rapidly, and the attention of officers should chiefly be directed to the safety of the forests which have already been placed under protection. In making these arrangements, the recurrence of unusually dry seasons, such as that of 1879, should be duly provided for.

North-Western Provinces and Oudh.

44. In the North-Western Provinces and Oudh the areas attempted and actually protected during the last three years have been as follows:—

Year.	Area in acres		Cost on 1,000 acres protected.
	Attempted.	Protected.	
			Rs.
1877-78	376,384	344,658	53
1878-79	392,012	301,291	51
1879-80	420,413	423,109	58

These results give promise of good progress in future.

Punjab.

45. The Punjab Report again records great damage done by forest fires, which have occurred in almost every division, and have been most destructive in Hazára and Ráwalpindi. In Ráwalpindi no less an area than 124,000 acres has been burnt. Regarding the fires in these two districts, His Honor the Lieutenant-Governor of the Punjab, in paragraph 5 of his orders on the Provincial Forest Report, passed orders as follows:—

> The damage caused by fires in the Hazára and Ráwalpindi districts, and especially the latter, has been very serious. The Lieutenant-Governor regrets that it has twice been necessary during the year to visit with severe censure the conduct of the Deputy Commissioners of these two districts in the matter of prosecuting and punishing forest offences. His Honour is determined that the policy laid down by Government, after careful investigation, shall be carried out by all Government officers, and that forest offences shall not be overlooked, nor the decision of the cases delayed. Reserved forests are the property of Government in exactly the same sense as money in the Government Treasury is, and the district officer is as much bound to protect the one as the other. Sir R. Egerton trusts that this will be distinctly understood by all officers, and that such neglect of Government interests in forests, as has taken place in Hazára and Ráwalpindi, will not again be brought to his notice.

At Chánga Mánga, 370 acres of new plantation, about 4 feet high, and 52 acres of the oldest part of the plantation were burnt, and fires of less extent occurred at Nág and in other plantations.

Central Provinces.

46. Progress in the first class reserves of the Central Provinces appears from the following figures:—

Year.	Area in acres		Cost on 1,000 acres protected.
	Attempted.	Protected.	
			Rs.
1877-78	702,310	575,304	18
1878-79	740,319	691,363	16
1879-80	827,470	715,773	17

Nearly one-half of the total area of the first class reserves (1,622,454 acres) is now under protection; but though there has been steady progress, the year under review has been unfortunate on account of the numerous and extensive failures. Large areas previously protected were burnt, and among these are 37,120 acres in the Banjar sál forest, Mandla district, which had been protected since 1875; the whole of the Barela reserve, in the same district, of 7,153 acres, protected since 1872; and large areas of first class reserves in the Seoni, Betúl, and Nimár districts.

Damage done to forests previously protected.

47. It is a question not easy to determine, whether fire does more damage in a forest which has hitherto been subject to the annual conflagrations, or in

a forest which for a series of years had been protected. Nor is the result likely to be the same in all provinces and in all districts. One effect of continued protection is that the growth of high grass is diminished; another is that the dry wood on the ground accumulates, only decaying gradually, instead of being consumed by the annual fires. Thus, while in a forest which has some time been under protection the fires spread less readily, owing to the less extent of areas stocked with high grass, their violence is increased by the dry wood, of which large quantities accumulate. So much is certain, that it is a great misfortune when a forest which had previously been protected is permitted to burn, for the seedlings and coppice shoots which had sprung up are killed, or, if not killed, they are cut back to the ground, and thus the work of years is undone. The policy in fire conservancy should be to extend operations slowly and cautiously, and before any extensions are attempted, to make quite sure that the forests previously taken in hand are safe.

Burma.

48. In Burma progress is slow, but steady. The season was favourable on account of the heavy rains in April, and the figures for the last three years have been as follows :—

Year.	Pegu Circle.			Tenasserim Circle.		
	Area in acres		Cost on 1,000 acres protected	Area in acres		Cost on 1,000 acres protected.
	Attempted.	Protected.		Attempted.	Protected.	
			Rs.			Rs
1877-78 ...	38,765	37,564	203	45,150	30,634	15
1878-79 ...	41,897	39,552	224*	32,970	31,770	30†
1879-80 ...	55,467	54,172	139	43,170	42,241	30

The cost of these operations is still high in Pegu, but it is diminishing. In the Tenasserim Circle the outlay is comparatively small, chiefly because most of the forests specially protected are situated in districts in which the surrounding forest on which the Karens habitually make their toungya clearings is carefully protected and fire-traced by them.

Coorg.

49. In Coorg the results were less satisfactory than in the previous year. The figures of the last two years are as follows :—

Year.	Area in acres		Cost on 1,000 acres protected.
	Attempted.	Protected.	
			Rs.
1878-79	138,061	129,478	27
1879-80	122,819	102,865	44

One of the teak plantations (Karmad), of 229 acres, was unfortunately burnt.

Ajmere.

50. In the Ajmere reserves the effect of continued protection has been greatly to increase the risk from fire. With the exception of some areas in Merwara, most of the hills were bare and naked when protection commenced, and hence the first result of protection was that the ground became covered with a dense growth of grass. Of this grass a large portion is utilised as cattle-fodder by villages in the vicinity, but much remains on the ground which greatly facilitates the spread of fire. It is satisfactory that, in spite of the increased difficulty of protection, the failures were not extensive. Of 64,428 acres, the protection of which was attempted, the failures aggregated 1,914 acres, the largest area being 1,656 acres in the Todgarh tract.

Berar.

51. In Berar fire protection was successful in the Northern Division, where failures were insignificant. The area protected, however, was less than

* In paragraph 45 of the Review for 1878-79, Rs 193 were incorrectly entered as the rate per 1,000 acres on 39,552 protected acres in the Pegu Circle, the correct figure under "outlay" being Rs. 8,847, and not Rs. 7,626

† In paragraph 45 of the Review for 1878-79, Rs 28 were incorrectly entered as the rate per 1,000 acres on 31,770 protected acres in the Tenasserim Circle, the correct figure under "outlay" being Rs. 968, and not Rs. 900

in previous years, because no protection was attempted of that part of the former Gugamal reserve which was excluded from the reserved area in 1878-79. In South Berar the result was less satisfactory. Out of 135,643 acres, the protection of which was attempted, no less than 63,360 acres were burnt, disastrous fires having occurred in all the principal reserves.

Plantations and other reproducing measures.

Summary.

52. The figures in the following statement include only regular plantations; but, as in previous reviews, an account of the chief reproductive works for the improvement of the forests will be given in the remarks which follow the statement. In this respect reference is invited to paragraphs 55 to 57 of the Review for 1877-78.

Area of plantations in 1879-80 *and extensions made during the year.*

Province.	Area				Expenditure		
	At the commencement of the year.	Added during the year.	Excluded during the year.	At the close of the year.	Previous to the year.	During the year.	Total.
	Acres.	Acres.	Acres.	Acres.	Rs.	Rs.	Rs.
Bengal .. .	799*	142	...	941	77,434*	10,963	88,397
North-Western Provinces and Oudh.	1,952*	310	...	2,262	34,792*	4,879	39,671
Punjab	17,098	825	53	17,870	7,69,716	49,344	8,19,060
Central Provinces	...	...	...	...	...	...	...
British Burma	3,339	50	...	3,389	2,87,585	13,104	3,00,689
Coorg	480*	100	...	580	31,427*	4,488	35,915
Ajmere	434	2	20	416	28,170	2,290	30,460
Assam	958	130	...	1,088	43,592	13,735	57,327
Total ...	25,060	1,559	73	26,546	12,72,716	98,803	13,71,519
Mysore	3,086	425	...	4,411	1,36,676	22,723	159,399
Berar	1,938	...	434	1,504	41,027	3,223	44,250
Grand Total ...	30,984	1,984	507	32,461	14,50,419	1,24,740	15,75,168
Deduct revenue	...	...	...	...	95,312	62,337	1,57,649
Net outlay on plantations ...	...	...	...	...	13,55,107	62,412	14,17,519

Bengal.

53. In Bengal the principal extensions were 40 acres in Sitapahár of the Chittagong district, and 84 acres in the forests which furnish the fuel supply for Darjeeling.

North-Western Provinces and Oudh.

54. In the North-Western Provinces and Oudh the chief additions recorded in the local reports were—*deodar*; 110 acres in the Naini Tal forests, 10 acres in Jaunsár (Bodiar): *deodar and other trees*; 50 acres in the Landour Cantonment: *sissoo;* 136 acres in the Ramgarh forest of the Gorakhpur district, on land formerly stocked with sál. As regards the last item, there is some doubt concerning the area actually planted, and the Conservator reports that the figures are subject to correction. Experiments in cultivating sissoo, but without definite success, have also been made in land on which that tree grows naturally on the banks of the Suheli river in the Kheri forests. In the Punjab, sissoo has been found to be a tree most easy to cultivate, and at first sight there seems no reason why its cultivation in Oudh should be more difficult.

Punjab.

55. The Punjab Report records an addition of 700 acres† at Subáthu, where operations have been commenced in order to produce fuel for that and the neighbouring military stations, and of 125 acres in Rakh Kot Lakhput. It is, however, doubtful whether these areas are sufficiently well stocked to be classed as additions. An area of 39 acres on the banks of the Ravi river, near Lahore, has been washed away; and some corrections in the returns have been made, the result of which is a reduction of the area by 53 acres.

* These opening balances have been altered, as compared with the closing balances in the statement for 1878-79, to correspond with the correct figures given in the provincial Reports for 1879-80.

† It has since been ascertained that the area is much less.

The revenue realized from these plantations, by the sale of thinnings, grass, and by grazing, during the year under review was Rs. 62,337, which exceeds the amount realized in any previous year. This amount includes Rs. 4,800 realized by the sale of the wood standing on 60 acres of the Ludhiána plantation, sold to the Railway for the construction of a spur to prevent further erosions of the Sutlej. The rate realized was Rs. 80 per acre, which compares favourably with the amount expended on this plantation, *viz.*, Rs. 37 per acre.

Planting work done in other divisions of the Punjab.

56. As in previous reviews, the figures entered in the above statement include only the operations in the plantation division, and the work done in the whole province appears from the following abstract:—

	On 1st April 1879.		During 1879-80.		On 31st March 1880.	
	Area.	Cost.	Area.	Cost.	Area.	Cost.
	Acres.	Rs.	Acres.	Rs.	Acres.	Rs.
Other divisions	2,302	15,004	156	4,012	2,458	19,916
Plantation division	17,098	7,69,716	772	49,344	17,870	8,19,060
Total ...	19,400	7,85,620	928	53,356	20,328	8,38,976

A difference, which is due to corrections in the returns, will be noticed between the opening balance now entered and the closing balance recorded in the Review for 1878-79.

Burma.

57. In Burma the figures recorded in the above statement include only the regular plantations. Adding toungya plantations (areas planted with teak by Karens on their toungyas or hill clearings), the total area planted with teak at the close of the year stood as follows:—

	Acres.	Outlay.	
		Total.	Per acre.
		Rs.	Rs. A.
Regular plantations	3,389	3,00,689	88 11
Toungya „	2,515	24,932	9 14

The high cost of the regular plantations is due to the heavy outlay incurred on the older plantations before the art of planting teak had been fully mastered. In future it is believed that the cost of the regular plantations will not exceed Rs. 40 per acre. On the other hand, the existing toungya plantations are, as a rule, most imperfectly stocked, which is chiefly due to the subsequent clearings of the teak plants having been insufficient. The plants come up and are paid for, but they are smothered by bamboos and other growth. In future it will be necessary to clear these plantations more effectually, and this will considerably raise their cost. The cost of future toungya plantations is estimated at Rs. 14 per acre. Under no circumstances can toungya plantations be expected to be as completely stocked as regular plantations.

Should regular plantations be abandoned?

58. Nevertheless, they may be expected to produce the same quantity of teak at less cost, and the question therefore arises whether the formation of regular plantations should not be entirely abandoned in favour of toungya plantations. The reason why this is not advisable is, that in the case of the latter the selection of the localities to be planted must to a great extent be left to the Karens; while for regular plantations the localities are selected with special regard to the conditions most favourable for the development of the teak tree, and, what is of paramount importance, the economical export of timber. At present the extraction of teak timber from the forests is costly, chiefly because the trees are scattered and at a distance from streams which permit floating; and in all planting operations the point to be kept in view prominently must be, that the timber which will grow up on these plantations may be brought to market at the least possible cost.

59. Besides the plantations here mentioned, operations for the improvement of the forests have been undertaken on a large scale. These works principally consist in dibbling in teak seed in places where the bamboos had flowered, or in forests without bamboos where the trees had been girdled in order to admit light. By this and other methods an aggregate area of 1,726 acres has been operated upon, chiefly in the Promo and Tharrawaddy districts of Pegu. Here, as in the plantations, the chief difficulty hitherto experienced has been the profuse and rapid growth of bamboos, by which the young teak is impeded in its growth and, not rarely, smothered. Other cultural operations.

60. In Coorg numerous additions, aggregating 100 acres, are recorded in the report; but it seems doubtful whether the total area returned at the close of the year, *viz.*, 580 acres, can be regarded as completely stocked. Coorg.

61. In Assam 118 acres were added to the Charduar caoutchouc plantation, and 10 acres were planted with teak at Kulsi. The cultivation of the Assam India-rubber tree (*Ficus elastica*) is now carried on in a systematic manner in three different localities in Assam:—on a large scale (803 acres at the close of the year) at the foot of the hills in the Darrang district, in the forests where the tree is indigenous, and in a climate thoroughly favourable for its development; and on a smaller scale in other localities under a different climate, *viz.*, at Kulsi in the Kámrúp district, and on the Brahmaputra river near the station of Tezpur. The result of these operations may be expected eventually to be of great importance. Assam.

62. In Berar the frosts of December 1879 and January 1880 were abnormally severe and did much damage, not only to the plantations, but also to the natural young growth in the forests. In the Kinwat reserve, on the Penganga river in South Berar, in latitude 19° 30′ north and at no great elevation, 434 acres of old plantations and 277 acres planted in 1879, stocked chiefly with teak, are reported as having been completely destroyed. During the same winter severe frosts, doing damage to young forest growth, were also noticed in several districts of the Central Provinces. The frequent occurrence of severe night frosts in the tropical districts of Central India is most remarkable. They only occur where the climate is dry, and not in districts with a moister climate. The recorded area of plantations in Berar has also been diminished by corrections made in previous returns, so that the aggregate area has been diminished from 1,938 acres, the closing balance in April 1879, to 1,504 acres. Berar.

63. The records of planted areas in most provinces are far from perfect, and it is desirable that in future greater care should be taken to include stocked areas only in these returns. The aggregate area of plantations in the different provinces is recorded as 32,461 acres, a portion of which, however, will probably be struck out from the returns of future years. After deducting the revenue realized under this head (in the Punjab only), the net outlay is Rs. 14,17,519, corresponding to Rs. 43 per acre. These figures, it will be remembered, relate only to what have been styled regular plantations, and do not include the other operations undertaken, in many instances on a large scale, for the improvement of the forests. General remarks.

Forest Survey.

64. The survey of the outer Kumaun forests was continued, and it is estimated that the completion of the field work in Kumaun and Garhwál will probably require two more seasons. Survey of Kumaun and Garhwal forests.

The survey of the Ránikhet forests was nearly completed, and that of the Kotigadh, in the forests leased from Tiri-Garhwál, was commenced.

The operations of this branch of the Forest Department are under the general control, in professional matters, of the Surveyor General of India, and General Walker has expressed himself satisfied with the work accomplished during the year.

Outlay on demarcation and improvement of forests.

65. The outlay recorded under this head in 1878-79 was exceptionally high, owing to large payments made in Bengal for the purchase of forests. Hence in the year under review the expenditure under this head in Bengal was less, and it was also less in the Punjab on account of a less outlay under plantations. In most other provinces the outlay under this head has increased slowly, but steadily, and the increase generally corresponds with the progress made in the work. Outlay

Outlay on demarcation and improvement of forests.

Province.	Demarcation, Improvement, and extension of Forests—A. VIII.						
	Demarcation.	Compensation for land and rights.	Surveys and working plans.	Plantations.	Protection from fire.	Other works.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Bengal ..	8,714	1,358	91	10,964	7,432	328	28,887
N. W. Provinces and Oudh	5,824	2,505	5,867	1,340	21,470	10,816	47,822
Punjab ...	9,036	152	1,252	26,587	77	13,662	50,766
Central Provinces ..	1,226	50	921	3,661	11,319	8,837	26,014
British Burma ...	12,603	505	499	13,677	9,536	6,701	43,521
Coorg ..	2,180	...	...	4,488	4,626		11,294
Assam ...	5,069	...	3,278	13,736	6,354	1,649	30,086
Ajmere ...	...	...	...	2,546	485	624	3,655
Surveys ...	...	..	5,909	...	...	..	5,909
Total ...	44,652	4,570	17,817	76,999	61,299	42,617	2,47,954
Mysore ...	1,321	...	...	27,345	2,311	...	30,977
Berar ...	647	40	...	3,583	2,747	676	7,693
Grand Total ...	46,620	4,610	17,817	1,07,927	66,357	43,293	2,86,624

The outlay under this head during the last five years has been as follows:—

	Rs.
1875-76	2,47,226
1876-77	2,61,560
1877-78	2,67,666
1878-79	3,30,467
1879-80	2,86,624

Communications and buildings.

Summary.

66. The outlay on communications, buildings, and other works charged in the accounts of the year has been as follows:—

Province.	Communications and Buildings—A. VII.			
	Roads and bridges.	Buildings.	Other works.	Total.
	Rs.	Rs.	Rs.	Rs.
Bengal	4,577	13,175	35	17,787
North-Western Provinces and Oudh	41,431	47,504	3,227	92,162
Punjab	4,302	5,112	205	9,679
Central Provinces	1,847	1,240	636	3,723
British Burma	1,949	25,242	865	28,056
Coorg	317	582	..	929
Assam	1,493	5,859	..	7,352
Ajmere	459	666	...	1,125
Surveys	..	.	.	.
Total ...	56,465	99,380	4,968	1,60,813
Mysore	146	2,481	...	2,627
Berar	4,036	1,098	246	5,380
Grand Total ...	60,647	1,02,959	5,214	1,68,820

Bengal.

67. In Bengal 55 miles of new road have been made, and three houses for the accommodation of the officers in charge of the Teesta, Kurseong, and Chittagong divisions (for which rent is paid), have been built at Kalimpung, Dhobijhora, and Rangamati.

68. In the North-Western Provinces and Oudh the outlay is distributed over the three circles as follows:— North-Western Provinces and Oudh.

	Rs.
School Circle	34,670
Central „	24,884
Oudh „	32,608
Total ...	92,162

In the School Circle there was an extraordinary outlay of Rs. 26,060 for a house for the accommodation of the Forest School. Of the balance, Rs. 5,400 were expended in Jaunsár on the maintenance and improvement of roads and inspection paths; Rs. 1,314 in the Dehra Dún division, where 56 miles of fair weather cart-roads were made; and Rs. 367 in Saháranpur, where 22½ miles of road were either made or improved.

In the Central Circle Rs. 7,921 were expended on roads in Kumaun, where the cart-road up the Nindhore valley was completed, and the bridle-path along the top of the outer range which separates that valley from the Bhábar was made. These works will have the effect of opening up the rich, and hitherto almost untouched, forests of this valley for the export of bamboos, sál, and other woods. In the same division Rs. 1,600 were spent upon rest-houses. In Garhwál the expenditure on roads was Rs. 10,772, on buildings Rs. 871, and on other works Rs. 1,000.

69. In Burma the outlay in the two circles has been as follows:— Burma.

	Rs.
Pegu Circle	26,802
Tenasserim Circle	1,254
Total ...	28,056

The chief items are Rs. 15,716 for buildings in the Tharrawaddy division, which includes the construction of a first class bungalow at the Tharrawaddy head-quarters, and Rs. 4,987 for buildings in the Rangoon division, the particulars of which are not stated in the report.

70. In Assam numerous rest-houses have been built at suitable places, and much has been done in making new roads and bridle-paths. The outlay was as follows:— Assam.

	Rs.
Roads and bridges	1,493
Buildings	5,859
Total ...	7,352

Compared with the amount of work accomplished, the outlay appears moderate.

71. The work done in the other provinces under this head calls for no special remark. Conclusion.

The outlay on communications and buildings during the last five years has been as follows:—

	Rs.
1875-76	1,23,927
1876-77	1,19,701
1877-78	1,13,784
1878-79	1,22,812
1879-80	1,68,820

CHAPTER II.

MANAGEMENT OF GOVERNMENT FORESTS NOT INCLUDED WITHIN RESERVED FORESTS, AS WELL AS THE SECOND CLASS RESERVES IN THE CENTRAL PROVINCES.

72. No material changes took place in the year under review in regard to the constitution and management of the Government forests not included within reserved forests; and it will suffice here to quote the remarks which were made by the Government of India regarding the management of the second class reserves in the Central Provinces, when communicating their orders on the Forest Report for 1879-80 to the Chief Commissioner:— Second class reserves in the Central Provinces.

8. The organization introduced in 1877, under which district forest officers were to be attached to those districts in which the forests are of sufficient importance, and were to

have charge under the Deputy Commissioners of what are now the second class reserves, and under the Conservator of the first class reserves, was expected, among other advantages, to promote a better administration of the large areas which were then called unreserved forests. From the remarks recorded in paragraph 15 of your review, however, it would seem that your expectations in this respect had not in all cases been realized. The President in Council fully concurs with you in regarding the proper management of the second class reserves as a matter of great importance, both to the Government and to the people. The chief difficulty doubtless consists in the large extent of these forests, and in the fact that they do not, like the first class reserves, consist of a limited number of compact blocks, but of a large number of pieces of irregular shape, varying in size, interspersed with cultivation and with private forests.

9. In paragraph 11 of your review you draw the Conservator's attention to the question whether it might not be of advantage to take under the direct control of the department forest tracts near large towns, with the view of making them permanently productive as forest-bearing areas. The suggestion is one of importance, and such areas, if they exist near towns, near groups of large villages, or in the vicinity of densely-populated districts, might be set apart and treated as first class reserves.

10. Major Doveton deserves credit for the progress which has already been made in the Central Provinces in utilizing the first class reserves for supplying the requirements of the people in their vicinity. It is satisfactory that he has even succeeded in permitting the pasture of cattle on a large scale in these forests, without apparently interfering with their protection from fire. The following figures which are extracted from his report are interesting, as they show the number of cattle sent for grazing during the year into some of the first class reserves :—

	Buffaloes.	Cows and bullocks.	Sheep and goats.	Remarks.
First Class Reserves.				
Mandla Division	476	4,594	12(*c*)	(*a*) Buffaloes and camels.
Hoshangabad Division	6,717	35,174	770	(*b*) Cows only.
Nimár „	10,013(*a*)	19,720	1,022	(*c*) Goats only.
Chánda „	421	6,118(*b*)	335(*d*)	(*d*) Sheep only.
Sconi „	4,454	29,385	5,699(*e*)	(*e*) Goats only. In addition to those numbers, 37,209 head of cattle of all kinds were grazed on license for short periods.
Saugor „	2,714	10,237	56(*f*) (sheep only)	(*f*) Also 2,404 ponies and donkeys.

In utilizing the produce of the reserved forests, the Conservator has shewn that, when areas are taken up for strict conservation, it does not follow that they should be finally closed against pasture and cutting. On the contrary, as soon as the forest growth in the protected areas becomes really thick, large quantities of produce can be made available for towns or villages in their vicinity. Hence it is clear that to set apart blocks of forests near large towns and villages does not imply that they will be closed and that their produce will not be utilized.

11. From the extracts given in paragraph 232 from Colonel Thompson's report regarding the second class reserves in Damoh, some progress appears to have been made in that district in the selection of suitably-situated blocks, to be strictly protected and improved. The selection of such areas should now be taken in hand on a systematic plan in all districts. The subject has repeatedly been discussed on previous occasions. In the orders on the Report for 1873-74, the Government of India said that the permanent reservation of defined though limited areas would prove more beneficial to future generations than the probably fruitless attempts to preserve the forest in wide tracts of country, over the greater portion of which cutting, grazing, and burning must be permitted. Attention was drawn to the fact that the reserves of the Central Provinces were so unequally distributed over the country, that they would only suffice to satisfy local demands in a few districts. It was suggested that the requirements of each group of villages should be considered in detail, and that, as soon as the enquiry in one district had been completed, a report should be submitted with specific proposals for the demarcation of strictly protected blocks in that district.

12. And in paragraph 14 of your orders on the Report for 1875-76, when speaking of the proposal to add the best portion of the unreserved forests to the reserves, you said :—'It may suffice at first to mark off the selected area and give it entire rest, withdrawing it from those lands from which the rural and urban population draw their supplies, and then, should circumstances permit, the regular department can assume charge and commence measures of improvement and renovation.'

In his Report for 1876-77 the Conservator observed that in many instances the Government had, within easy reach of the more thickly-populated country, tracts of forest land which

at that time were comparatively unproductive, and he advocated that the most advantageously situated of these lands should be taken in hand by the Forest Department. And in paragraph 39 of your orders on that report, you urged the formation of new reserves in areas easy of access.

13. It would be premature now to enter upon any speculations regarding the future management of the second class reserves, but eventually the best plan may be to set apart selected blocks in the vicinity of towns and large villages to be permanently maintained as forest, while the remainder will either be used for the extension of cultivation, or will be available to furnish pasture and fuel. If this view is correct—that eventually grass, bamboos, building wood, and timber will, as far as Government forests are concerned, chiefly be supplied from the first class reserves, while the second class reserves will mainly furnish pasture and fuel—then it ought not to be impossible, after collecting the needful data, to determine the extent of land which should and may be set apart in each district as first class reserved forest in the vicinity of towns and populous tracts.

14. The first step in such an enquiry would be to ascertain approximately the number of cattle which, on an average, graze in these areas during the year, the quantity of firewood furnished, and the annual yield of the areas in bamboos, timber, and wood for agricultural and domestic purposes. The data recorded on these subjects in the annual reports are incomplete, and it would be well if the Conservator would in future reports attempt, as far as possible, to give a complete account of the amount of pasture and all descriptions of forest produce yielded by both the first and second class reserves. In those districts where the system of commutation still exists, it would be necessary to supplement the facts by an approximate estimate of the produce drawn from the forests under that system. The following figures which are extracted from Major Doveton's Report, show the number of cattle grazed on annual licenses in the second class reserves of those districts, for which data are given :—

	Buffaloes.	Cows and bullocks.	Sheep and goats.	Remarks.
Second Class Reserves.				
Nágpur District	20,575(a)	112,903(a)	40,827(a)	(a) Of these, there were grazed on license for short periods 13,915 buffaloes, 22,422 cows and bullocks, and 16,769 sheep and goats.
Saugor „	41,218	176,557	14,303	
Seoni „	2,745	166,568	4,066(b)	(b) Goats only.
Hoshangabad District	33,316(c)	177,420(c)	35,252(c)	(c) Of these, there were grazed on license for short periods, 11,025 buffaloes, 97,165 cows and bullocks, and 33,654 sheep and goats.
Nimár „	27,854	106,479	6,351	
Chhindwára „	115,556	25,088	7,734	

CHAPTER III.

PROTECTION OF GOVERNMENT FORESTS.

73. The following statement shows the number of prosecutions for breaches of forest rules during 1879-80 in the different provinces :— Summary.

Province.	Number of persons		
	Prosecuted.	Convicted or under trial.	Acquitted.
Bengal	158	120	38
North-Western Provinces and Oudh	893	704	189
Punjab	1,833	1,123	710
Central Provinces	2,718	2,484	234
British Burma	204	146	58
Coorg	18	4	14
Ajmere	290	256	34
Assam	135	97	38
Total ...	6,249	4,934	1,315
Mysore	319	223	96
Berar	475	377	98
Grand Total ...	7,043	5,534	1,509

74. In Bengal the only divisions where prosecutions have been at all heavy are the Darjeeling division, in the Darjeeling district, and the Sundarbans division, in the 24-Pergunnahs, the Jessore, and the Backergunge districts. The number of persons prosecuted in the Darjeeling division was 22, and in the Sundarbans 86. Bengal.

North-Western Provinces and Oudh.

75. In the North-Western Provinces and Oudh the results in the three circles stand as follows :—

	Number of persons	
	Prosecuted.	Convicted or under trial.
School Circle	129	102
Central „	580	465
Oudh „	184	137
Total ...	893	704

In the Central circle the prosecutions were most numerous in the Kumaun division (353 persons prosecuted).

Punjab.

76. In the Punjab prosecutions were most numerous in the Ráwalpindi division, where 551, and in the Beas division, where 463 persons were implicated.

Central Provinces

77. The large increase of prosecutions in the Central Provinces is exceptional, and is due chiefly to a mistaken action taken in the Sambalpur district. Apart from this, the number of cases was largest in the Jubbulpore district, where 765 persons were involved, 741 of whom were convicted.

The reports from other provinces call for no remark.

Percentage of acquittals.

78. The following statement gives an abstract of the prosecutions, convictions, and acquittals during the six years since 1874-75 :—

Year.	Number of persons			
	Prosecuted.	Convicted or under trial.	Acquitted.	Percentage of acquittals on prosecutions.
1874-75	3,066	2,688	378	12 per cent.
1875-76	4,833	4,310	523	11 „
1876-77	5,009	3,817	1,192	23 „
1877-78	5,419	3,906	1,513	28 „
1878-79	5,076	4,014	1,062	20 „
1879-80	7,043	5,534	1,509	21 „

There has been a steady increase, but the numbers are very small if compared with the large area of forest under protection.

CHAPTER IV.

YIELD AND FINANCIAL RESULTS.

Summary.

79. In Bengal, the North-Western Provinces, the Punjab, and Assam, Conservators have classified the receipts and expenditure of the year under the three great heads of Departmental Timber Operations, Other Revenue, and the Formation, Protection, and Improvement of the Forests. But as this has not been done in all provinces, it has been necessary once more to prepare the following abstract of the financial results of the year on the summary plan followed in previous years :—

Particulars.	Receipts.		Charges.	
	Amounts.	Budget heads.	Amounts.	Budget heads.
	Rs.		Rs.	
1. Timber and other produce removed on Government account ...	25,68,198	I.	14,65,447	I, ½ of VI, ½ of B.
2. Timber and other produce removed by purchasers, and other revenue ..	28,81,858	II, III, IV, V.	6,60,303	II, III, IV, IX, ½ of VI, ½ of B.
3. Formation, protection, and improvement of the forests ...	.....	.....	11,75,385	V, VII, VIII, ½ of B.
Total ...	54,45,056	.....	33,01,135	.....

80. The average revenue realized, and the charges incurred, on account of timber brought to depôt by Government agency have been as follows during the last six years :— Timber brought to depot by Government agency.

Year.	Receipts.	Charges.
	Rs.	Rs.
1874-75	24,34,000	19,16,000
1875-76	35,00,000	16,13,000
1876-77	27,00,000	18,20,000
1877-78	29,01,000	15,58,000
1878-79	24,00,000	15,13,000
1879-80	25,03,000	11,05,000
Average ...	27,59,000	16,52,000

The charges include a due proportion of establishment and general charges.

The exceptionally high receipts under this head in the three years ending with 1877-78, and the corresponding high charges during the three years ending with 1876-77, are chiefly due to the exceptionally large timber sales in Burma. Leaving these abnormal years out of consideration, there seems ground for believing that the cost of the Government timber operations, as compared with the revenue, is diminishing.

81. The remaining forest revenue consists of the following amounts :— Other forest revenue.

	Rs.
Timber removed by purchasers	24,27,484
Confiscated drift and waif wood	1,05,661
Revenue from forests not managed by Government ...	2,39,601
Other revenue	1,09,112
Total ...	28,81,858
The charges debitable to this revenue amount to	6,60,303

And during the last five years the receipts and charges on account of the other sources of revenue have been as follows :—

Years.	Receipts.	Charges.		
		A.—Conservancy and Works.	B.—Establishments.	Total
	Rs.	Rs.	Rs.	Rs.
1874-75	24,53,861	2,26,271	2,50,734	4,77,005
1875-76	22,73,791	2,55,668	2,67,190	5,22,858
1876-77	23,81,331	2,61,486	2,95,761	5,57,247
1877-78	26,14,795	2,58,729	3,13,197	5,71,926
1878-79	25,68,070	2,97,371	3,32,206	6,29,577
1879-80	28,81,858	3,31,857	3,28,446	6,60,303

82. A glance at Statement II appended to this review will show that the remarks recorded in paragraphs 88 to 94 of the Review for 1878-79 are still applicable. In the North-Western Provinces and Oudh and in Burma the forest revenue does not show any signs of increase. In Burma the total suspension of girdling operations since 1876 has not diminished the revenue as much as might be expected. The gross revenue of the last two years is considerably larger than any realized previous to the three exceptionally favourable years which commenced with 1875-76. Girdling operations have now been recommenced, and it is to be hoped that in arranging them, and in fixing the annual quantity of trees to be felled, the ultimate aim and object of the management of these forests, as well as their peculiar character, will not be lost sight of. No increase of revenue in the North-Western Provinces and Oudh and in Burma.

83. The chief aim and object of the management of the Burma forests is briefly as follows :—At present the mean annual imports of teak timber from all sources into Rangoon and Moulmein amounts to about 200,000 tons a year, and this figure may be taken as representing the annual consumption of teak timber in Burma, India, and other countries; the other sources of supply being insignificant. Of this large quantity, the forests in British territory at present supply only about one-eighth part. But the forests Caution necessary in working the Burma forest

beyond the frontier, although of vast extent, have been worked recklessly for a long series of years without any care for their regeneration; and thus it may be regarded as certain that the time will come when their resources will fail, and when the requirements of the world's trade in the matter of teak timber must be supplied from the forests in British territory.

Condition of the Burma forests.

84. These forests are not extensive, and they have been greatly damaged by toungya cultivation. But demarcation and the protection of the demarcated areas has now commenced in earnest, and the great point to be kept in view during the next period, while the supply of teak timber from beyond the frontier is still plentiful, is to plant teak as extensively as possible and to arrange the cuttings of mature trees with due regard to the regeneration of the forests. At the present time the temptation is great to make heavy fellings, in order to show a large revenue. If the forests were pure, consisting of teak only, the damage done by such heavy fellings would not be great. But the forests are not pure. Teak forms only a small proportion of the forests, and it is associated with bamboos and with numerous other trees, many of which grow much more rapidly than teak, and all of which are ready to take up the space wherever teak has been felled.

To place the comparatively small area of teak-producing forest in British Burma in a position eventually to supply the whole or the greater part of the teak timber consumed in Burma, India, and other countries, is a task of great difficulty, and can only be accomplished by a prudent self-denial in the matter of yield and revenue during the present time.

Other provinces.

85. The Punjab shows signs of an increasing revenue, and it is satisfactory that there has at the same time been a decrease of expenditure, both under "Conservancy and Works," and "Establishments."

The steady increase of the forest revenue in Bengal, the Central Provinces, and Assam continues without interruption, and furnishes strong proof of the beneficial effects of demarcating the forests which it is intended to maintain permanently.

Export of forest produce.

86. The export of the principal articles of forest produce to non-Indian ports during the year under review has been as follows:—

Articles.	Quantity in tons of 20 cwt.; in the case of teak, 50 cubic feet.		Valuation at port of shipment in 1879-80.	
	Average of nine years, 1870-71—1878-79.	In 1879-80.	Total.	Per ton.
			Rs.	Rs.
1. Caoutchouc	622	577	10,31,394	1,787
2. Shell-lac	3,538	2,477	30,41,855	1,228
3. Lac-dye	518	689	2,26,568*	329
4. Sandalwood, ebony, and other ornamental woods ...	412	597	3,90,805	655
5. Cutch and Gambier	10,716	11,106	28,13,994	253
6. Myrobalans	23,405*	17,749	15,80,818	89
7. Teak	44,571	38,420	28,19,590	73

It has been stated that the demand for myrobalans during the year under review was less than in previous years. It is more probable that the deficient crop in North Kanara, which yields a large proportion of the quantity exported, has been the cause of the diminished exports.

Sandalwood.

87. The quantity and value of the sandalwood sold on account of Government in Mysore and Coorg during 1879-80 were as follows:—

		Tons.	Amount realized.	
			Per ton.	Total.
			Rs.	Rs.
Mysore	Good wood	1,212	311	4,34,712
	Inferior wood	184¼		
Coorg	Good wood	57¾	527	30,308
	Inferior wood	43½	128	5,582
	Total ...	1,497¼	314	4,70,602

* Average of four years only.

88. The trade in teak timber in British Burma during the last three years has been as follows:— Teak.

Year.	Yield of Government forests in British Burma.	Imports from Foreign territory.	Total.	Exports from Rangoon and Moulmein to Indian and other ports.
	[In tons of 50 cubic feet.]			
1877-78 ...	*39,081	208,198	247,279	161,176
1878-79 ...	*22,763	170,610	*193,373	133,820
1879-80 ...	17,585	157,260	174,845	†121,161

89. Excluding Mysore and Berar, the surplus forest revenue from the British Provinces during the last three years has been as follows :— Surplus revenue.

Presidency.	Years.		
	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.
Bengal	19,47,038	12,05,937	15,96,541
Madras	21,671	40,089	*Def.* 15,478
Bombay	4,04,585	1,82,732	4,68,399
Total ...	23,73,294	14,28,758	20,49,462

A larger surplus was realized in 1877-78 and in two preceding years, *viz.*, Rs. 24,19,094 in 1873-74, and Rs. 27,53,311 in 1875-76. But the result is better than in 1878-79 and in previous years, save the two years already mentioned.

* These figures are taken from the Chief Commissioner's orders on the Forest Report for 1879-80. They do not agree with the figures entered in the Reviews for 1877-78 and 1878-79.

† As stated above (paragraph 86), the export of teak timber to non-Indian ports amounted to 38,420 tons only during the year under review: the balance, 82,741 tons, was shipped to Indian ports.

STATEMENT I.

Summary of Revenue and Expenditure during the year 1879-80.

Budget Headings.	Bengal.	North-Western Provinces and Oudh.	Punjab.	Central Provinces.	British Burma.	Coorg.	Assam.	Ajmere.	Surveys.	Total of the British Provinces under the Government of India.	Mysore.	Berar.	Total of Mysore and Berar.	Grand Total of all Provinces.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Receipts—														
I.—Timber and other produce removed from the forests by Government agency ...	1,35,403	6,35,714	3,37,483	2,00,594	7,10,397	48,107	13,334	644	...	20,81,676	4,80,724	798	4,81,522	25,63,198
II.—Timber and other produce removed from the forests by consumers or purchasers.	3,02,788	3,90,722	2,96,900	7,48,454	1,36,686	45,372	1,43,959	432	...	20,65,313	59,604	3,02,567	3,62,171	24,27,484
III.—Confiscated drift and waif wood ...	1,231	6,244	607	4,154	89,970	14	826	...	...	1,03,046	707	1,908	2,615	1,05,661
IV.—Revenue from forests not managed by Government	...	...	1,739	...	2,32,693	...	5,169	...	...	2,39,601	...	...	...	2,39,601
V.—Miscellaneous	10,102	7,286	13,090	53,521	10,444	8,293	1,048	785	38	1,04,607	2,277	2,228	4,505	1,09,112
Total ...	4,49,524	10,39,966	6,49,819	10,06,723	11,80,190	1,01,786	1,64,336	1,861	38	45,94,243	5,43,312	3,07,501	8,50,813	54,45,056
Expenditure—														
A.—Conservancy and Works—														
I.—Timber and other produce removed from the forests by Government agency ...	65,112	2,55,103	1,19,638	1,47,680	3,73,067	17,480	12,679	266	...	9,91,025	69,190	32	69,222	10,60,247
II.—Timber and other produce removed from the forests by consumers or purchasers	24,440	26,454	1,111	1,30,547	6,997	...	1,060	5	...	1,90,614	...	4,568	4,568	1,95,182
III.—Confiscated drift and waif wood ...	95	449	19	17	36,027	...	91	...	...	36,698	5	...	5	36,703
IV.—Revenue from forests not managed by Government	...	...	110	...	...	...	...	...	...	110	...	...	...	110
V.—Rent of leased forests and payments to shareholders in forests managed by Government	...	12,504	32,257	1,118	...	...	50	...	...	45,929	...	17,120	17,120	63,049
VI.—Live and dead stock	12,380	25,712	3,501	43,524	39,497	786	18,277	222	2,746	1,46,645	458	6,404	6,862	1,53,507
VII.—Communications and buildings ...	17,787	92,162	9,679	3,723	28,056	929	7,352	1,125	...	1,60,813	2,627	5,380	8,007	1,68,820
VIII.—Demarcation, improvement, and extension of forests	28,897	47,822	50,766	26,014	43,521	11,294	30,086	3,655	5,909	2,47,954	30,977	7,693	38,670	2,86,624
IX.—Miscellaneous	1,594	3,385	3,746	5,757	2,527	53	2,562	7	...	19,631	2,322	1,155	3,477	23,108
Total Conservancy and Works ...	1,50,295	4,63,591	2,20,827	3,58,380	5,29,692	30,542	72,157	5,280	8,655	18,39,419	1,06,579	42,352	1,47,931	19,87,350
B.—Establishments—														
I.—Salaries	1,10,355	2,12,795	2,11,949	1,36,715	1,80,705	19,935	52,427	7,132	29,362	9,60,775	72,440	57,756	1,30,196	10,90,971
II.—Travelling allowances	10,091	29,738	35,659	17,240	34,058	3,965	5,665	958	6,036	1,43,413	8,455	6,166	14,621	1,58,034
III.—Contingencies	5,004	10,470	12,241	10,238	9,035	1,322	2,581	380	2,824	54,095	6,445	4,240	10,685	64,780
Total Establishments ...	1,25,453	2,53,003	2,59,849	1,64,193	2,23,798	24,622	60,673	8,470	38,222	11,58,283	87,340	68,162	1,55,502	13,13,785
Grand Total of Expenditure ...	2,75,747	7,16,594	4,80,676	5,22,573	7,53,490	55,164	1,32,830	13,750	46,878	29,97,702	1,92,919	1,10,514	3,03,433	33,01,135
Surplus	1,73,777	3,23,372	1,69,143	4,84,150	4,26,700	46,622	31,506	..	...	15,96,541	3,50,393	1,96,987	5,47,380	21,43,921
Deficit	...	...	...	...		...		11,889	46,840	...	...	...	...	

STATEMENT II.

Receipts and Charges of the Forest Department throughout India during the sixteen years from 1864-65 to 1879-80.

RECEIPTS.

Provinces.	1864-65.	1865-66.	1866-67 (11 months).	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Bengal	...	38,584	50,555	75,657	2,24,546	1,13,753	1,19,678	1,39,086	1,49,851	1,16,633	1,85,933	1,98,274	2,22,401	4,26,228	4,16,024	4,49,524
North-Western Provinces and Oudh ...	6,93,644	7,70,370	7,79,200	5,77,644	7,85,211	8,33,077	4,25,257	11,70,901	19,39,114	19,32,677	13,63,358	12,64,356	11,50,671	12,03,108	11,26,755	10,39,966
Punjab	2,95,730	2,08,050	2,31,470	2,79,297	3,45,164	3,94,132	10,40,368	7,35,002	6,52,994	7,32,540	8,34,874	9,05,742	5,98,754	6,83,710	4,76,575	6,49,819
Central Provinces	89,307	2,02,644	3,67,095	3,49,491	3,50,536	4,16,020	6,58,120	4,47,764	4,81,673	5,68,367	6,61,779	7,25,335	6,61,326	6,83,910	8,52,862	10,06,723
British Burma	9,36,233	8,98,629	4,24,053	6,47,590	8,16,171	9,84,773	8,18,124	7,72,399	8,27,469	10,68,621	10,74,802	17,79,020	15,51,468	16,03,023	11,37,562	11,80,190
Coorg	1,02,218	1,08,257	31,934	77,716	74,448	1,08,152	74,067	92,453	84,424	1,10,079	58,012	1,07,457	75,929	1,01,015	52,020	1,01,786
Ajmere	...	...	...	...	...	...	...	...	24	506	203	410	905	3,002	1,241	1,861
Assam	...	...	...	...	...	...	...	...	...	62,726	64,749	1,07,302	81,568	1,34,326	1,61,779	1,64,336
Surveys	...	...	...	...	...	...	...	...	...	...	...	...	...	...	63	38
Total ..	21,17,132	22,26,534	18,84,307	20,07,455	25,96,078	28,49,907	31,35,614	33,57,607	41,35,549	45,92,151	42,43,710	50,87,996	43,43,022	48,38,322	42,24,881	45,94,243
Madras	3,11,778	3,26,204	3,38,608	4,24,184	3,91,179	4,95,789	3,39,762	4,18,882	4,18,767	4,64,194	3,64,326	4,26,359	4,15,312	4,04,164	3,83,878	3,65,750
Bombay and Sind	10,70,210	10,07,610	8,21,268	8,84,245	12,13,482	12,35,257	11,77,425	11,50,210	11,46,404	11,88,090	12,23,995	12,48,672	12,26,638	12,61,529	11,81,893	15,24,712
Total Revenue (British India) ...	34,99,120	35,60,348	30,44,183	33,15,884	42,00,737	45,80,953	46,52,801	49,26,699	57,00,720	62,44,435	58,32,031	67,62,927	59,84,992	65,04,015	57,90,652	64,84,705
Mysore	2,16,331	3,42,959	2,66,026	4,10,012	3,51,476	2,95,218	3,37,669	3,99,511	3,76,185	4,97,060	3,83,124	4,56,271	4,66,956	4,58,588	4,52,575	5,43,312
Hyderabad	2,368	15,106	43,574	53,446	84,556	1,45,481	1,77,329	1,55,544	2,59,861	2,63,256	2,60,674	2,32,817	2,53,136	2,79,231	2,85,670	3,07,501
Total Revenue (Mysore and Hyderabad).	3,18,699	3,58,065	3,09,594	4,63,458	4,36,032	4,40,699	5,14,998	5,55,055	6,36,046	7,60,316	6,43,798	6,89,088	7,20,092	7,37,819	7,38,245	8,50,813
GRAND TOTAL OF REVENUE ..	38,17,819	39,18,413	33,53,777	37,79,342	46,36,769	50,21,652	51,67,799	54,81,754	63,36,766	70,04,751	64,75,829	74,52,015	67,05,084	72,41,834	65,28,897	73,35,518

STATEMENT II—*continued.*

EXPENDITURE.

A.—On Conservancy and Works.

Provinces.	1864-65.	1865-66.	1866-67 (11 months).	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Bengal	2,092	19,480	89,326	1,41,382	95,581	61,004	26,272	43,907	28,526	28,552	39,062	68,255	90,172	1,46,857	2,10,914	1,50,295
North-Western Provinces and Oudh ...	3,82,780	2,45,158	2,66,187	2,74,818	3,69,869	3,59,149	5,94,829	8,95,931	9,54,515	9,72,991	8,75,039	5,40,335	6,50,002	5,09,798	5,72,085	4,63,591
Punjab	1,62,120	1,94,110	1,76,950	1,75,920	1,93,516	5,55,375	10,30,005	4,78,003	5,45,068	3,54,457	4,19,305	3,18,498	2,70,330	2,58,949	2,58,952	2,20,827
Central Provinces...	35,610	38,504	46,817	1,13,068	1,86,925	3,65,801	1,95,251	1,24,621	1,33,666	1,67,010	1,78,513	2,40,523	1,67,334	1,78,401	2,36,029	3,58,380
British Burma	1,77,158	2,21,739	2,04,591	2,25,049	3,22,981	3,11,404	2,89,445	2,45,514	2,03,929	3,32,391	5,31,341	6,60,515	8,22,064	6,40,062	5,00,783	5,29,692
Coorg	4,688	3,995	4,425	5,354	7,175	22,851	14,822	20,714	18,324	23,001	23,773	25,991	18,493	16,456	14,671	30,542
Ajmere	...	...	...	...	...	...	...	...	4,878	15,777	17,753	12,963	11,433	6,961	5,182	5,280
Assam	...	...	...	...	...	...	...	...	...	18,901	31,138	33,187	42,005	48,954	64,519	72,157
Surveys	...	...	...	...	...	...	...	...	8,303	7,420	3,906	5,134	7,684	10,024	10,663	8,655
Total ...	7,64,448	7,22,986	7,88,296	9,35,591	11,76,047	16,75,584	21,50,624	18,08,690	18,97,209	19,20,500	21,20,330	19,05,401	20,79,517	18,16,459	18,73,798	18,39,419
Madras	94,657	1,36,528	1,14,251	1,62,037	1,32,693	1,46,821	1,56,779	1,94,814	3,03,735	1,75,370	2,21,864	2,39,945	1,94,943	1,59,867	1,24,337	1,63,367
Bombay and Sind	3,17,699	5,63,067	4,36,470	3,32,175	3,87,412	3,28,985	3,84,638	3,27,729	4,34,612	4,11,547	5,20,049	4,80,801	5,30,394	5,36,477	6,37,117	6,59,701
Total (British India) ...	11,76,804	14,22,581	13,39,017	14,29,803	16,96,152	21,51,390	26,92,041	23,31,233	26,35,556	25,07,417	28,62,243	26,26,147	28,04,854	25,12,803	26,35,252	26,62,487
Mysore	14,022	42,979	32,165	52,317	59,274	44,252	81,061	87,326	95,959	1,12,460	1,08,401	1,10,772	1,09,761	81,213	81,742	1,05,579
Hyderabad	...	...	...	2,184	6,552	22,018	43,034	62,759	45,062	44,117	45,514	42,287	40,506	49,715	39,544	42,352
Total (Mysore and Hyderabad) ...	14,022	42,979	32,165	54,501	65,826	66,270	1,24,095	1,50,085	1,41,021	1,56,577	1,53,915	1,53,059	1,50,267	1,30,928	1,21,286	1,47,931
GRAND TOTAL ...	11,90,826	14,65,560	13,71,182	14,84,304	17,61,978	22,17,660	28,16,136	24,81,318	27,76,577	26,63,994	30,16,158	27,79,206	29,55,121	26,43,731	27,56,538	28,10,418

B.—On Establishments.

Provinces.	1864-65.	1865-66.	1866-67. (11 months.)	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Bengal	6,604	16,292	14,881	24,223	30,676	34,870	60,186	64,429	71,090	56,936	60,341	70,831	1,21,517	1,14,354	1,27,757	1,25,453
North-Western Provinces and Oudh ...	92,893	1,06,125	1,05,282	1,08,204	1,31,090	1,69,531	1,81,047	2,01,020	2,07,917	1,92,949	1,85,663	1,95,994	2,10,247	2,18,427	2,37,892	2,53,003
Punjab	84,665	77,968	78,680	97,955	1,15,828	1,58,279	2,03,951	2,27,321	2,50,874	2,42,705	2,27,175	2,35,728	2,52,153	2,58,217	2,64,602	2,59,849
Central Provinces	61,946	74,994	81,041	99,031	1,07,730	1,08,445	1,12,182	1,07,059	1,11,171	1,16,546	1,15,726	1,20,240	1,21,306	1,39,277	1,57,686	1,64,193
British Burma	86,081	90,327	80,544	1,03,339	99,191	1,10,058	1,11,293	1,32,935	1,32,095	1,42,140	1,30,797	1,54,235	1,82,980	2,15,754	2,17,618	2,23,798
Coorg	4,201	8,654	7,127	8,610	9,301	10,231	9,777	10,267	11,340	11,708	14,226	11,688	14,836	19,814	20,158	24,622
Ajmere	...	...	...	...	...	...	...	...	8,177	8,563	8,813	14,363	11,025	7,965	8,263	8,470
Assam	...	...	...	...	...	...	...	..	...	31,721	28,385	28,697	47,915	51,363	61,508	60,873
Surveys	...	...	...	...	...	..	..	...	12,875	42,852	53,614	53,859	49,820	49,684	49,662	38,222
Total of Establishment Charges ...	3,36,390	3,74,360	3,67,555	4,41,362	4,93,816	5,91,414	6,78,436	7,43,031	8,08,539	8,46,120	8,28,740	8,95,655	10,11,799	10,74,825	11,45,146	11,55,283
Total of all Charges ...	11,00,838	10,97,346	11,55,851	13,76,953	16,69,863	22,66,998	28,29,060	25,51,721	27,05,748	27,66,620	29,49,070	28,01,056	30,91,316	28,91,284	30,18,944	29,97,702
Madras	95,300	1,17,054	1,02,920	1,26,223	1,37,779	1,39,870	1,38,081	1,50,902	1,74,412	1,77,814	1,76,008	1,90,138	2,19,027	2,22,626	2,19,452	2,17,861
Bombay	2,10,352	2,11,987	2,10,973	2,14,962	2,39,711	2,15,811	2,38,125	2,57,035	2,78,430	2,93,990	2,96,071	2,97,676	3,01,548	3,20,466	3,62,044	3,96,612
Total of Establishment Charges (British India)	6,42,042	7,03,401	6,81,448	7,82,547	8,71,306	9,47,095	10,54,642	11,50,968	12,61,381	13,17,924	13,00,819	13,83,469	15,32,374	16,17,918	17,26,642	17,72,756
Total of all Charges (British India)	18,18,846	21,25,982	20,20,465	22,12,350	25,67,458	30,98,485	37,46,683	34,82,201	38,96,937	38,25,341	41,63,062	40,09,616	43,37,228	41,30,721	43,61,594	44,35,243
Mysore	53,018	54,768	52,823	57,725	60,677	59,998	64,381	71,776	96,159	1,23,773	1,28,321	1,24,520	1,17,101	1,17,710	1,16,278	87,340
Hyderabad	478	8,991	13,718	16,157	27,553	58,692	38,938	38,071	37,994	41,523	45,875	48,586	54,146	60,253	67,805	68,162
Total of Establishment Charges (Mysore and Hyderabad) ...	53,496	63,759	67,541	73,882	88,230	1,18,690	1,03,319	1,09,847	1,34,153	1,65,296	1,74,196	1,73,106	1,71,247	1,77,963	1,84,083	1,55,502
Grand Total of Establishment Charges	6,95,538	7,67,160	7,48,989	8,56,429	9,59,536	10,65,785	11,57,961	12,60,815	13,95,534	14,83,220	14,75,015	15,56,575	17,03,621	17,95,881	19,10,725	19,28,258
GRAND TOTAL OF ALL CHARGES ..	18,86,364	22,32,720	21,20,171	23,40,733	27,21,514	32,83,445	39,74,097	37,42,133	41,72,111	41,47,214	44,91,173	43,35,781	46,58,742	44,39,612	46,67,263	47,38,676

STATEMENT II—*concluded.*

SURPLUS REVENUE.

PROVINCES.	1864-65.	1865-66.	1866-67 (11 months.)	1867-68.	1868-69.	1869-70.	1870-72.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
British India, excluding Madras and Bombay.	10,16,294	11,29,188	7,28,456	6,30,502	9,26,213	5,82,909	3,06,554	8,05,886	14,29,801	18,25,531	12,94,640	22,86,840	12,51,706	19,47,038	12,05,937	15,96,541
The Presidency of Madras ...	1,21,821	72,622	1,21,437	1,35,924	1,20,707	2,09,098	44,902	73,166	(Deficit 59,380)	1,11,010	(Deficit 33,546)	(Deficit 3,724)	1,342	21,671	40,069	(Deficit 15,478)
„ of Bombay ...	5,42,159	2,32,556	1,73,825	3,37,108	5,86,359	6,90,461	5,54,662	5,65,446	4,33,362	4,82,553	4,07,875	4,70,195	3,94,716	4,04,585	1,82,732	4,68,399
TOTAL NET REVENUE (BRITISH INDIA).	16,80,274	14,34,366	10,23,718	11,03,534	16,33,279	14,82,468	9,06,118	14,44,498	18,03,783	24,19,094	16,68,969	27,53,311	16,47,764	23,73,294	14,28,758	20,49,462
Mysore	2,49,291	2,45,212	1,80,032	2,99,970	2,31,525	1,90,968	1,92,227	2,40,409	1,84,067	2,60,827	1,46,402	2,20,979	2,40,094	2,59,665	2,54,555	3,50,393
Hyderabad	1,890	6,115	29,856	35,105	50,451	64,771	95,357	54,714	1,76,805	1,77,616	1,69,285	1,41,944	1,58,484	1,69,263	1,78,321	1,96,987
TOTAL NET REVENUE (MYSORE AND HYDERABAD).	2,51,181	2,51,327	2,09,888	3,35,075	2,81,976	2,55,739	2,87,584	2,95,123	3,60,872	4,38,443	3,15,687	3,62,923	3,98,578	4,28,928	4,32,876	5,47,380
GRAND TOTAL OF NET REVENUE.	19,31,455	16,85,693	12,33,606	14,38,609	19,15,255	17,38,207	11,93,702	17,39,621	21,64,655	28,57,537	19,84,656	31,16,234	20,46,342	28,02,222	18,61,634	25,96,842

STATEMENT III.

Price of Firewood in 1878, 1879, *and* 1880.

[Quantities per rupee in seers of 80 tolahs.]

Province.	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
Madras.	Vizagapatam	1878	136 1	136 1	136 1	136 1	136 1	121 8	121 10	106 14	97 3	92 5	88 6	88 6
		1879	88 6	88 6	88 6	88 6	88 6	88 6	88 6	87 8	87 8	87 8	87 8	87 8
		1880	87 8	72 14	86 6	86 6	86 6	86 6	86 6	86 6	86 6	86 6	87 8	87 0
	Average ...		104 0	99 1	103 9	103 9	103 9	98 12	98 13	93 9	90 6	88 12	87 13	87 10
	Nellore	1878	98 8	109 8	109 8	101 7	101 9	98 3	122 5	77 13	77 13	55 6	97 3	64 10
		1879	97 3	97 3	97 3	97 3	97 3	97 3	93 5	93 5	93 5	93 5	93 5	93 5
		1880	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5
	Average ...		96 5	100 0	100 0	97 5	97 6	96 4	102 15	88 2	88 2	80 11	94 10	83 12
	Bellary	1878	97 2	97 2	97 2	97 2	97 2	97 3	97 3	92 5	92 5	92 5	92 5	97 3
		1879	97 3	97 3	97 3	97 3	55 14	97 3	97 3	92 5	92 5	92 5	92 5	92 5
		1880	92 5	97 3	97 3	97 3	97 3	97 3	97 3	97 3	97 3	97 3	97 3	97 3
	Average ...		95 9	97 2	97 2	97 2	83 6	97 3	97 3	94 4	94 4	94 4	94 4	95 9
	Madras	1878	85 0	85 0	85 0	83 8	83 8	82 10	82 10	77 13	87 8	85 0	82 10	82 10
		1879	82 10	82 10	82 13	82 10	85 0	85 0	88 11	87 8	87 8	87 8	87 8	87 8
		1880	87 8	87 8	87 8	87 8	87 8	87 8	87 8	87 8	87 8	87 8	86 5	76 8
	Average ...		85 0	85 0	85 1	84 9	85 5	85 1	86 4	84 4	87 8	86 11	85 8	82 3

STATEMENT III—*continued.*

Province.	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
MADRAS—*continued.*	Chingleput	1878	97 2	97 2	97 2	97 2	97 2	97 3	97 3	97 3	97 3	97 3	107 14	107 14
		1879	102 2	102 2	93 5	93 5	89 6	97 3	93 13	108 14	107 14	107 14	87 8	102 2
		1880	103 0	102 8	95 14	97 3	85 8	82 10	93 5	97 3	97 3	97 3	92 13	92 13
	Average ...		100 12	100 9	95 7	95 14	90 11	92 5	94 12	101 1	100 12	100 12	96 1	100 15
	Tinnevelly	1878	66 6	66 6	66 6	66 6	66 6	66 10	66 10	66 10	66 10	66 10	66 10	66 10
		1879	66 10	66 10	66 11	66 10	66 10	66 10	81 10	81 10	81 10	81 10	81 10	81 10
		1880	76 13	76 13	76 13	76 13	76 13	76 13	76 13	81 10	81 10	81 10	81 10	81 10
	Average ...		69 15	69 15	69 15	69 15	69 15	70 0	75 0	76 10	76 10	76 10	76 10	76 10
	South Kanara	1878	81 6	106 9	103 0	99 1	94 8	89 14	85 0	82 10	92 5	97 3	102 2	102 2
		1879	106 14	112 11	123 14	128 5	117 10	105 0	102 2	98 3	85 0	80 3	80 3	85 8
		1880	94 8	97 3	95 3	97 3	101 2	94 13	94 5	94 5	94 13	96 3	96 3	[not given]
	Average ...		94 4	105 8	107 6	108 3	104 7	96 9	93 13	91 11	90 11	91 3	92 13	...
	Bombay	1878	68 4	68 4	68 4	68 4	61 6	61 6	61 6	61 6	61 6	61 6	61 6	61 6
		1879	61 6	61 6	75 1	61 7	61 6	75 1	57 14	54 9	71 10	57 14	54 9	54 9
		1880	57 14	57 14	61 6	71 10	61 6	54 9	54 9	54 9	54 9	54 9	61 6	61 6
	Average ...		62 8	62 8	68 4	67 2	61 6	63 11	57 15	56 13	62 8	57 15	59 2	59 2
	Ahmedabad	1878	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
		1879	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	60 0
		1880	60 0	60 0	70 0	70 0	70 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...		73 5	73 5	76 11	76 11	76 11	80 0	80 0	80 0	80 0	80 0	80 0	73 5

Bombay.	Kaira		1878	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
			1879	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
			1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
		Average ...		80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Tanna (Salsette)		1878	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
			1879	80 0	80 0	80 0	80 0	80 0	80 0	74 0	71 0	66 0	71 1	71 1	71 1	71 1
			1880	71 1	71 1	71 1	71 1	71 0	71 0	71 1	71 1	71 1	71 1	71 1	71 1	71 1
		Average		77 0	77 0	77 0	77 0	77 0	77 0	75 0	74 0	72 6	74 0	74 0	74 0	74 0
	Poona		1878	55 0	55 0	55 0	55 0	61 0	61 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0
			1879	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0
			1880	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0
		Average ...		69 0	69 0	69 0	69 0	71 0	71 0	76 0	76 0	76 0	76 0	76 0	76 0	76 0
	Sholápur		1878	67 6	75 8	75 4	85 0	96 0	110 0	98 7	98 1	98 8	85 8	80 0	95 0	
			1879	91 8	106 10	107 0	134 0	128 0	122 0	116 0	116 0	106 10	116 1	119 0	116 6	
			1880	102 6	102 6	79 0	79 8	80 0	80 0	78 12	80 0	99 1	96 1	94 0	91 1	
		Average ...		87 1	94 13	87 1	99 8	101 5	104 0	97 12	98 0	101 6	99 3	97 11	100 13	
	Ahmednagar		1878	80 5	80 0	80 0	80 0	85 5	90 5	91 6	78 0	106 1	79 0	79 0	78 0	
			1879	79 0	79 0	79 0	79 0	79 0	78 0	100 2	100 0	100 0	100 0	100 0	100 0	
			1880	90 0	97 0	91 0	106 4	106 4	106 4	106 1	106 4	106 4	106 4	106 4	106 4	
		Average ...		83 2	85 5	83 5	88 7	90 3	91 8	99 4	94 12	104 2	95 1	95 1	94 12	

STATEMENT III—*continued.*

Province.	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
BOMBAY—*continued.*	Dharwar (Hubli)	1878	..	..	89 0	160 0	98 0	89 0	89 0	89 0	89 0	89 0	80 0	80 0
		1879	80 0	80 0	80 0	160 0	80 0	80 0	80 0	80 0	80 0	89 0	80 0	80 0
		1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...		..	...	83 0	133 5	86 0	83 0	83 0	83 0	83 0	86 0	80 0	80 0
	Baroda	1878	91 7	91 7	107 2	106 6	107 13	108 4	110 0	108 8	109 8	109 13	102 0	96 0
		1879	96 0	109 13	96 0	...	96 0	96 0	96 0	96 0	96 0	96 0	54 0	63 0
		1880	80 0	91 8	91 8	91 8	91 8	91 8	80 0	80 0	86 0	86 0	80 0	80 0
	Average ...		89 2	97 9	98 3	...	98 7	98 9	95 5	94 13	97 3	97 4	78 11	79 11
	Nasirabad	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	90 0	95 5	80 0	60 0
		1879	90 0	90 0	90 0	100 0	100 0	100 0	90 0	90 0	80 0	90 0	73 5	70 0
		1880	65 10	70 0	75 0	80 0	85 0	85 0	80 0	75 0	75 0	75 0	75 0	75 0
	Average ...		85 3	86 11	88 5	93 5	95 0	95 0	90 0	88 5	81 11	86 12	76 2	68 5
	Rájkot	1878	40 0	40 0	40 0	40 0	40 0	40 0	40 0	37 8	35 0	35 0	40 0	40 0
		1879	40 0	47 8	70 0	70 0	70 0	70 0	79 0	65 0	65 0	70 0	70 0	70 0
		1880	70 0	70 0	70 0	80 0	77 8	75 0	75 0	70 0	70 0	70 0	70 0	80 0
	Average ...		50 0	52 8	60 0	63 5	62 8	61 11	61 11	57 8	56 11	58 5	60 0	63 5
	Burdwan	1878	120 0	120 0	120 0	120 0	120 0	120 0	120 0	120 0	120 0	120 0	100 0	100 0
		1879	100 0	100 0	100 0	100 0	100 0	120 0	85 0	90 0	90 0	90 0	90 0	80 0
		1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...		100 0	100 0	100 0	100 0	100 0	106 11	95 0	96 11	96 11	96 11	90 0	86 11

Bengal.	Howrah	1878	115 0	100 0	80 0	100 0	100 0	110 0	110 0	110 0	110 0	130 0	110 0	110 0
		1879	105 0	100 0	100 0	90 0	90 0	90 0	90 0	110 0	90 0	95 0	90 0	100 0
		1880	105 0	95 0	90 0	90 0	90 0	80 0	80 0	80 0	100 0	100 0	80 0	80 0
		Average ...		108 5	98 5	90 0	93 5	93 5	93 5	93 5	100 0	100 0	108 5	93 5	96 11
	Calcutta	1878	110 0	100 0	100 0	64 0	64 0	64 0	64 0	64 0	64 0	66 0	66 0	66 0
		1879	66 0	64 0	64 0	64 0	64 0	85 0	85 0	85 0	84 0	90 0	90 0	90 0
		1880	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0
		Average ...		88 11	84 11	84 11	72 11	72 11	79 11	79 11	79 11	79 5	82 0	82 0	82 0
	Bogra	1878	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8
		1879	67 8	67 8	67 8	67 8	80 0	67 8	67 8	67 8	67 8	67 8	67 8	67 8
		1880	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8	67 8
		Average ...		67 8	67 8	67 8	67 8	71 11	67 8	67 8	67 8	67 8	67 8	67 8	67 8
	Jalpáiguri	1878	80 0	80 0	64 0	64 0	64 0	64 0	64 0	65 0	54 0	54 0	64 0	64 0
		1879	75 0	75 0	64 0	64 0	64 0	64 0	64 0	160 0	64 0	64 0	64 0	64 0
		1880	64 0	64 0	64 0	64 0	65 0	24 0	64 0	64 0	64 0	64 0	64 0	64 0
		Average ...		73 0	73 0	64 0	64 0	64 5	50 11	64 0	96 0	66 11	60 11	64 0	64 0
Assam.	Cachar	1878	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
		1879	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
		1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	64 0	64 0	64 0	64 0
		Average .		80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	74 11	74 11	74 11	74 11

STATEMENT III—*continued.*

Province.	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
North-Western Provinces.	Muttra	1878	120 0	120 0	120 0	110 0	100 0	100 0	80 0	100 0	80 0	80 0	80 0	80 0
		1879	80 0	80 0	80 0	80 0	80 0	80 0	100 0	100 0	120 0	80 0	80 0	60 0
		1880	60 0	80 0	80 0	120 0	120 0	100 0	100 0	100 0	100 0	100 0	80 0	100 0
	Average ...	...	86 11	93 5	93 5	103 5	100 0	93 5	93 5	100 0	100 0	86 11	80 0	80 0
	Delhi	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	80 0	80 0
		1879	80 0	80 0	90 0	90 0	80 0	80 0	80 0	70 0	70 0	70 0	50 0	60 0
		1880	60 0	60 0	70 0	70 0	90 0	80 0	80 0	80 0	90 0	80 0	85 0	85 0
	Average ...	...	80 0	80 0	86 11	86 11	90 0	86 11	86 11	83 5	86 11	83 5	71 11	75 0
	Simla	1878	120 0	120 0	120 0	120 0	120 0	120 0	120 0	100 0	100 0	100 0	100 0	100 0
		1879	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	80 0	80 0	80 0
		1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...	...	100 0	100 0	100 0	100 0	100 0	100 0	100 0	93 5	93 5	86 11	86 11	86 11
	Amritsar	1878	110 0	110 0	110 0	110 0	110 0	100 0	110 0	110 0	110 0	110 0	100 0	80 0
		1879	80 0	95 0	110 0	110 0	110 0	110 0	110 0	110 0	110 0	90 0	90 0	80 0
		1880	80 0	90 0	90 0	90 0	90 0	90 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...	...	90 0	98 5	103 5	103 5	103 5	100 0	100 0	100 0	100 0	93 5	90 0	80 0

Punjab.	Lahore	1878	100 0	100 0	100 0	110 0	110 0	110 0	110 0	105 0	109 0	105 0	85 0	75 0
		1879	90 0	90 0	90 0	100 0	110 0	100 0	100 0	90 0	90 0	80 0	75 0	70 0
		1880	60 0	80 0	70 0	80 0	70 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...	...	83 5	90 0	86 11	96 11	96 11	96 11	96 11	91 11	93 0	88 5	80 0	75 0
	Ferozepore	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	65 0	70 0	75 0	90 0
		1879	90 0	90 0	90 0	100 0	70 0	70 0	80 0	70 0	80 0	80 0	70 0	70 0
		1880	70 0	70 0	70 0	90 0	90 0	70 0	70 0	70 0	80 0	80 0	70 0	70 0
	Average ..	...	86 11	86 11	86 11	96 11	86 11	80 0	83 5	80 0	75 0	76 11	71 11	76 11
	Gujránwála	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0
		1879	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0
		1880	100 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0	95 0
	Average ...	...	100 0	98 5	98 5	98 5	98 5	98 5	98 5	98 5	98 5	98 5	98 0	98 5
	Ráwalpindi	1878	100 0	100 0	100 0	100 0	80 0	100 0	90 0	90 0	80 0	80 0	60 0	60 0
		1879	60 0	70 0	80 0	80 0	80 0	60 0	50 0	50 0	40 0	32 0	32 0	24 0
		1880	24 0	32 0	32 0	36 0	40 0	50 0	50 0	40 0	35 0	32 0	32 0	50 0
	Average ...	...	61 5	67 5	70 10	72 0	66 10	70 0	63 5	60 0	51 10	48 0	41 5	44 10
	Mooltan	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	70 0
		1879	70 0	90 0	90 0	90 0	90 0	90 0	80 0	80 0	80 0	80 0	80 0	80 0
		1880	70 0	70 0	70 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...	...	80 0	86 11	86 11	90 0	90 0	90 0	86 10	86 10	86 10	86 10	86 10	76 10
	Bannu	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	105 0
		1879	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	100 0	80 0
		1880	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0	80 0
	Average ...	...	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	93 5	88 5

STATEMENT III—*continued.*

Province.	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
Punjab—*continued.*	Pesháwar	1878	91 8	91 0	90 0	79 8	80 0	110 0	99 0	97 0	103 0	65 8	86 0	61 0
		1879	67 0	73 0	98 0	86 0	85 0	78 0	78 0	78 8	60 0	64 8	61 0	48 8
		1880	48 0	54 0	62 0	61 0	54 0	51 0	50 0	48 0	48 4	55 9	61 0	62 4
	Average ...	...	68 13	72 11	83 5	75 8	73 0	79 10	75 10	74 8	70 6	61 13	69 5	57 4
	Kohát	1878	102 0	102 0	102 0	102 0	102 0	102 0	127 0	127 8	128 0	102 0	89 4	102 0
		1879	102 0	102 0	134 0	102 0	127 8	76 8	61 3	102 0	63 8	63 12	63 12	40 0
		1880	63 0	76 0	76 0	76 8	76 8	63 12	61 3	52 8	51 0	55 0	51 0	70 0
	Average ...	...	89 0	93 5	104 0	93 8	102 0	80 12	83 2	94 0	80 13	73 9	68 0	70 11
Central Provinces.	Raipur	1878	100 0	100 0	100 0	100 0	100 0	100 0	100 0	90 0	100 0	80 0	90 0	86 0
		1879	100 0	100 0	82 0	80 0	100 0	80 0	60 0	60 0	60 0	60 0	60 0	60 0
		1880	60 0	60 0	60 0	67 0	60 0	70 0	60 0	60 0	60 0	60 0	60 0	70 0
	Average ...	...	86 10	86 10	80 10	82 5	86 10	83 5	73 5	70 0	73 5	66 10	70 0	72 0
	Amráoti	1878	50 0	50 0	50 0	48 0	46 0	50 0	44 0	42 0	42 0	42 0	40 0	40 0
		1879	40 0	40 0	45 0	45 0	46 0	45 0	45 0	50 0	50 0	50 0	50 0	50 0
		1880	50 0	50 0	64 0	64 0	60 0	65 0	65 0	65 0	70 0	66 0	75 0	76 0
	Average ...	...	46 10	46 10	53 0	52 5	50 10	53 5	51 5	52 5	54 0	52 10	55 0	55 0

Hyderabad Assigned Districts.	Akola		1878	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
			1879	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
			1880	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
		Average ...	...	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
	Ellichpur		1878	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
			1879	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
			1880	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 6	64 0	64 9	64 0	64 0
		Average ...	...	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
	Basim		1878	100 0	100 0	64 0	100 0	160 0	100 0	100 0	100 0	64 0	64 0	64 0	64 0	64 0
			1879	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
			1880	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0	64 0
		Average ...	...	76 0	76 0	64 0	76 0	96 0	76 0	76 0	76 0	64 0	64 0	64 0	64 0	64 0
Mysore and Coorg.	Bangalore		1878	72 0	92 0	72 0	84 0	84 0	84 0	84 0	84 0	84 0	84 0	84 0	84 0	84 0
			1879	84 0	84 0	84 0	84 0	84 0	84 0	84 0	78 0	78 0	84 0	84 0	84 0	84 0
			1880	84 0	84 0	84 0	90 0	90 0	78 0	84 0	78 0	84 0	80 0	76 13	84 0	84 0
		Average ...	...	80 0	86 10	80 0	86 0	86 0	82 0	84 0	80 0	82 0	82 10	81 9	84 0	84 0
	Mysore		1878	72 0	75 0	72 0	75 0	75 0	75 0	75 0	84 0	84 0	78 0	78 0	78 0	78 0
			1879	78 0	78 0	81 0	81 0	81 0	90 0	78 0	78 0	90 0	78 0	78 0	78 0	78 0
			1880	78 0	78 0	78 0	78 0	78 0	78 0	78 0	78 0	75 0	78 0	78 0	78 0	78 0
		Average ...	...	76 0	77 0	77 0	78 0	78 0	81 0	77 0	76 10	83 0	78 0	78 0	78 0	78 0
	Kadur		1878	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0
			1879	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0
			1880	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0
		Average ...	...	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0	60 0

STATEMENT III—*concluded.*

Province	District.	Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
			S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.	S. C.
Rajputana.	Ajmere	1878	80 0	80 0	80 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0
		1879	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	90 0	70 0	60 0
		1880	60 0	70 0	70 0	70 0	70 0	70 0	70 0	70 0	70 0	70 0	70 0	70 0
	Average ...	...	76 10	80 0	80 0	83 5	83 5	83 5	83 5	83 5	83 5	83 5	76 10	73 5
Central India.	Indore	1878	100 0	100 0	100 0	120 0	120 0	140 0	105 0	80 0	80 0	96 0	96 0	96 0
		1879	96 0	96 0	96 0	107 0	107 0	107 0	107 0	107 0	96 0	96 0	96 0	96 0
		1880	96 0	96 0	96 0	96 0	96 0	120 0	87 0	87 8	87 8	87 8	96 0	100 0
	Average ...	...	97 5	97 5	97 5	107 10	107 10	122 5	99 10	91 8	87 13	93 3	96 0	97 5
	Gwalior	1878	91 4	100 7	100 7	100 7	100 8	100 7	100 7	100 7	100 7	100 7	91 4	91 4
		1879	91 4	91 0	109 0	118 10	109 8	109 8	109 8	109 8	100 7	91 4	89 8	51 3
		1880	68 7	91 0	91 0	100 6	118 10	100 6	100 6	91 4	91 4	100 6	109 8	109 8
	Average ...	...	83 10	94 2	100 2	106 8	109 8	103 7	103 7	100 6	97 6	97 6	96 13	83 15

Note.—In this statement are included those districts only where the price of firewood is high (less than 100 seers—equal to 205 lbs.—for the rupee).

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